ISSN 0144 3674

Computer Age

JUNE 1980 ISSUE 7 60p

- Computer Animation
- Education
- Business Guidelines

The Government and technology
by The Minister of State for Employment

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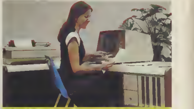

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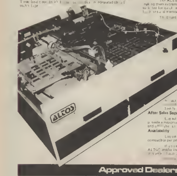

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Editorial

The spirit of the times

Why is it so important to know about computers, even if one doesn't use them? After all, video recorders and television sets are also marvels of technology but are treated only as consumer items. Why not simply regard computers in the same way?

Because, as every reader of *Computer Age* has grasped, anything which is going to affect you deeply must be given the respect of attention and understanding. Because understanding and foresight together widen the angle of opportunity. Because foresight and application together can make for a better world.

Since computing is a seemingly specialised field, it is only too easy to develop a one track mind. But there are other technologies, and it is a hallmark of wisdom to be as widely read as possible. Busy as one may be, it takes only a little of one's time to read the 'Futures' section of *The Guardian*, the science reports and supplements in *The Times*, the *Sunday Times* and *The Observer*, and alternative publications such as [illegible]. This may not make for great depth, but it serves to round one's view, and it serves also to show how astonishingly relevant computing is to the whole spectrum of science and art.

The spirit of the times is one of seriousness but — uniquely — it is coupled with a sense of adventure. No other new technology has been given the publicity given to the silicon chip, and no other new technology has found people so aware of its strengths, anticipating its effects and so determined to use it to the best possible advantage [illegible]

[illegible]

Iverson's Language

Silviculture

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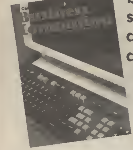

Computer Age has established itself as the best all round computing magazine in the market. But that's just the start. We are now launching a second monthly publication, called **Business Computing,** which will give more direct help to those who are already using computers in their business, or plan to do so.

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THE GOVERNMENT AND TECHNOLOGICAL CHANGE

Lord Gowrie, [illegible] Minister [illegible] State for Employment [illegible]

Governments are often accused of ignoring unpalatable facts and there is a charge that has frequently been levelled [illegible] on the question of the effects that microelectronic technology will have on employment. The charge can be answered [illegible] are the facts really unpalatable? And whether or not they are, what exactly is the [illegible]?

What are the facts? Many commentators would have us believe that directly as a result of applying microelectronic technology we will be faced with unemployment on an unparalleled scale: anything from 5m upwards within the next 5 to 10 years.

How realistic are these predictions? Most of them, in my view, are based on assumptions which are, to say the least, questionable. For example they often assume a static or very slowly growing economy, but one in which there will be very heavy investment in new methods of production. To state these two views together is to show immediately the inconsistency in the argument. However, the futurologists often go a step further and assume that the very fact that particular technologies exist explicitly determines the level of employment. Whilst there may be elements of truth in this where the direct requirements for manning on a production line are concerned, it is quite obvious that no such direct correlation exists in fields like administration, management and many other services. A modern economy exhibits many complex inter-relations which are only partially affected by technology.

Another assumption is one which says that anything technologically possible will translate rapidly into industrial practice. The reality is that many technical achievements [illegible] prove to be rather difficult to apply industrially as well as being costly [illegible] continuous operation. This is [illegible] true in a situation of [illegible] when an application [illegible] almost as soon as [illegible].

The implication is that applications are unlikely [illegible] at the revolutionary pace predicted; they will be spread over a much longer period and any effects on employment will consequently be spread out, allowing a much greater opportunity for their absorption.

The truth is that no one can predict what will happen to employment in real numbers with any degree of reliability. Those who attempt to do so are fooling [illegible] as well as the general public.

It may be possible, however, [illegible] future tendencies [illegible] by studying [illegible] applying [illegible] from [illegible] by an [illegible] the Department of Employment [illegible] report has [illegible] been published [illegible] The Manpower Implications of Microelectronic Technology [illegible] HMSO £[illegible]50). It conducted detailed studies covering over 60 firms in Britain, visited the USA and Japan and had discussions with trade unions, professional organisations and other bodies. The Study Group concluded that the adoption of new technology will be less of a threat to jobs than not adopting it. Furthermore, provided measures were taken to stimulate the rate of innovation

Employment

then the overall quantitative effects on employment of new technology over the next 5-10 years are unlikely to be significant.

Complementary evidence for that view is given by Clive Jenkins and Barrie Sherman in their book 'The Collapse of Work'. They say 'There is thus a choice. Remain as we are, reject the new technologies and we face unemployment of up to 5.5 million by the end of the century. Embrace the new technologies, accept the challenge and we end up with unemployment of about 5 million.' Now of course I would totally reject their base line estimates, but I think it does show rather neatly that their estimate of the incremental effect of not applying these technologies is the addition of an extra ½ million unemployed over 20 years. Those figures pale almost into insignificance when we consider the job changes which have occured in the past twenty years. Indeed, to be rather more radical, I would suggest that the increased job loss of not applying these technologies would be well in excess of 1 million.

The great problem in forecasting employment effects is that it is all too easy to demonstrate the job-destroying potential of new technology. The job creating potential is far less easily demonstrated even though, in the long run, it may turn out to be more important. New technology offers the prospect both of improved productivity and a range of new and improved products. Thus it provides opportunities to regain markets which have suffered from import penetration, and to open up new markets. This in turn can provide extra wealth and resources, thereby creating opportunities for growth across the whole economy and thus raising employment prospects. If industry grasps these opportunities there is no reason to believe that unemployment should be a serious threat.

It would be wrong and misleading to suggest that there will be no unemployment whatever as a result of applying new technology. There will obviously be some transitional problems as the nature of work changes, some jobs will disappear as others are created and the new jobs will not necessarily appear at the same time or in the same location as the old jobs lost. The effects will certainly be more noticeable in some areas of work than others and some regions and groups of employees will be more affected than others. Nevertheless, in this context it is significant that the changes will not take place overnight. The Government already has available a comprehensive range of policy measures to ease the process of job change; for example, given the likely pace of change, such measures should ensure that technological change can be handled without any major social disruption, and in their operation we have a flexible system capable of evolving to meet needs as they arise.

We must avoid the trap of devising radical policy changes to meet a technological future that is by no means certain. Proposals like work sharing through reduced working hours, for example, should be treated with caution. Their only effect might be to reduce productivity and competitiveness, and so increase unemployment. It is better that such developments should take place as a result of the successful application of new technology, not as a reprise to its introduction.

Although it is not possible to predict employment levels 10 or more years hence with any realism, we can make some qualitative judgements. If Britain falls behind in applying new technology we will lose competitiveness with more advanced countries who in turn will capture ever larger shares of our own and our overseas markets. That would lead to a further decline of Britain's industrial base with even more severe consequences for employment. The real danger for the UK is if the gradual evolution towards new technology turns out to be *too* gradual, whether through lack of investment, management or worker fears of any consequences or simple ignorance of the technology concerned. The current signs are that British industry is already beginning to lag behind its competitors and this is the problem we must now face. Arguments about how many people may or may not be made unemployed by applying new technology are pointless if jobs are being lost because of failure to apply it. So we have an overriding need to remove the constraints on rapid innovation.

> *'We must avoid the trap of devising radical policy changes to meet a technological future that is by no means certain'*

In this respect it would be wrong always to accuse trade unions of acting as a constraint. In spite of some unfortunate recent experiences, particularly in the printing industry, there are signs that they are well aware of the problems and are taking realistic steps to deal with them. The TUC's report 'Employment and Technology' offers a most constructive lead which unions and management alike would do well to consider. Its call for a collaborate approach on the introduction of new technology is surely right. It has become apparent from studies in firms where new technology has been introduced that the most successful firms, and those that have experienced the least transitional difficulties, have taken their unions into their confidence, have invited union views and have responded to them in a positive way.

The TUC report also advocates, where possible, the adoption of no redundancy agreements. A number of such agreements have been negotiated successfully and where this has happened innovation has taken place in a relatively co-operative and trouble free atmosphere. It is easy to see why this should be. Workers' greatest fear is loss of job security. Any such threat will inevitably lead to resistance or non co-operation. Remove that fear, through a 'no redundancy' or similar agreement, and the sun comes out again. Obviously such agreements will not be possible in every case, but where they are it is well worth pursuing them.

It is entirely to their good that the trade unions are taking micro-electronics seriously. But it is not true, as Clive Jenkins claimed in a recent article in *Computer Age*, that trade unions are the only organisation in this country doing so.

The engineering industry in particular is very active. Its Industry Training Board is developing post-graduate and other courses in micro-electronics and the Engineering Employers' Federation is also looking closely at possible problems. The CBI is getting together with the TUC to devise guidelines for the introduction of new technology.

Something of what the Government is doing was set out in an earlier article in *Computer Age* by David Mitchell, Parliamentary Under Secretary at the Department of Industry. He described the DI's Microprocessor Application Project which promotes awareness of micro electronics and encourages its application. The development of a sound technology based industry depends essentially on managers becoming aware of the possibilities of new technologies and having the confidence and ability to apply them. The Department of Industry also supports, through the National Enterprise Bord, such high technology companies as INMOS, INSAC and NEXOS.

In the Department of Employment the main emphasis is on training for the micro-electronics age. This is handled by the Department's agency, the Manpower Services Commission, which has adopted a three fold approach. It has asked the Industry Training Boards to take full account of the possible needs of new technology and to encourage industries to identify any particular needs which may arise; it is developing its own computer related courses and including a micro electronics content in skill-centre courses, and to meet immediate shortages of skilled staff it has introduced a three year programme to boost computer training.

On the question of training generally the main burden must fall on industry itself because it is industry which is best suited to define its own requirements and to match training provisions accordingly. The more generalised training provided through Government agencies can offer support, particularly for the needs of small firms, but the individual requirements of firms are so varied that there is a limit to what the public scheme can achieve.

In the longer term the real need is to provide a flexible and adaptable labour force able to acquire new skills in the face of changing technology. The key to this must be in raising the levels of initial educational attainment and training. That will not only help to provide a skilled work force but will also reduce the numbers of school leavers whose limited attainments would lead them to seek unskilled and semi skilled jobs which new technology will tend to displace or transform. ■

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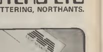

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During one working day a senior programmer at a large finance house in London stopped to admire the shiny and rather expensive new car that one of his colleagues had recently purchased. His day was continually interrupted by heating engineers who were busy inspecting the ducting near his office and near the computer suite. His frustration over the disturbance was aggravated by his inability to find the last listing of the program that he was currently working on. By the time that he found the listing, which had fallen behind a filing cabinet, it was time to go home.

Events like that have all happened at some time to those of us who work with computers, they are indicative of the petty jealousies and frustrations that can disrupt anybody's working day. But what if the programmer who owned the expensive car was a junior programmer in charge of maintaining the company's payroll program? He could be paying for the car by siphoning off a small amount of money from each employee's wage record and adding it to his own wage record. What if the 'heating engineers' were busy placing wire taps into the computer's communications lines in order to gain business information about the finance house? Perhaps photostated by a fellow programmer, this colleague having been bribed by a customer of the finance house to modify the program which was listed, so that on its next run the customer's loan account would be reduced to virtually nothing.

These are all instances of the growing occurrence of computer-related crimes, a problem which, according to a recent report by the F.B.I., is growing at the rate of 400% per year. Before outlining some of the ways in which the computer has been used for fraud, it would be useful to describe one of the common operations that has been carried out in the data processing environment in the sixties and seventies, the operation known as *batch updating*. It is this operation which has proven susceptible to the wiles of the computer criminal.

Batch Updating

Batch updating, often known as batch processing, was one of the common operations in data processing during the sixties and seventies. Even with the advent of large on-line systems, in which users access large centralised databases using communication lines, it should remain popular for many years to come.

Batch updating involves making changes to a file called a **master file**. This is a file around which a business enterprise or department of a business enterprise revolves. A typical example of a master file is that file in a bank which contains a **record** for *each customer*.

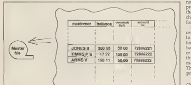
Every record would contain a large amount of **information** for a bank customer, important pieces of information would be the customer's name, address, current balance, overdraft limit and a series of debits and/or credits over a specified time period.

A master file has to be changed periodically. The most common change in the bank example involves modification of the balance and the series of credit/debits. A master file also may have new records added to it, this would correspond to a new customer for a bank, or have records deleted, this would correspond to a customer moving his account, or dying.

When changes to a master file can occur at specified regular intervals, then these changes can be batched together and a file called a **transaction file** created. This file is normally created from documents by data preparation staff. In the banking example the documents would typically be cheques, credit slips, address change forms and new account forms.

Both the transaction and master file are ordered on a common unique item of data. In the bank example, it would be the customer's account number. This enables a batch update program to change the master file efficiently. It does this by stepping through the transaction file, updating the master file and creating a *new* master file. The diagram shown (Fig. 1) describes this process.

You will see that a *new* master file is created, this is used as input when the batch update program is run again. Normally the new master file and the old master file are kept. Every master file that is created and kept is called a **generation** of



customer	balance	overdraft limit	account no
JONES S	200 68	50 00	72886221
TIMMS P S	17 22	150 00	72886222
ARMS V	150 11	50.00	72886223

Fig 1

the file Virtually all the text books on systems analysis describe three generations of a master file as being kept although I have met companies where up to twenty generations are retained

The reason why a number of generations of master file are kept is that of security If an enterprise only retained one master file, the destruction of that file by accident or through malice would be a disaster By keeping a series of master files and either the transaction documents or the transaction files corresponding to those master files a destroyed master file can be recreated, normally by running the update program against previous master files (Fig 2)

The box marked 'errors' which occurs in the diagram is concerned with the notification of errors which happen during the running of the update program A typical error which could occur in the banking example is where a data preparation clerk may mistype an account number on a transaction this wrong number would not occur in any record on the master file

In the diagram there is also a box marked reports and output documents In the banking example, some typical reports that would be produced would be a list of accounts that had exceeded their overdraft limit customers statements would also be included in this category

Security

An important part of many update programs also includes the printing of cheques and it is this aspect that often invites the computer criminal to attempt to interfere with batch processing systems

Why is computer crime so tempting?

The first reason is that many data processing systems involve both the large scale storage of financial data and the flow of large amounts of money This flow occurs with little of the checking that happens in a manual system A common sight in many computer rooms is that of a high speed line printer producing a large number of presigned cheques Often these cheques are automatically cut, folded and enveloped before being loaded into a post office bag for delivery Certainly in a manual payments system any abnormality, such as a large cheque being sent to a post office box would be spotted

Another reason for computer crime being tempting is that nothing is visible – almost all data is held on magnetic tapes and discs If an auditor wishes to find out what a file contains then he has to use a program, which is normally part of the operating system that prints out that file There is *no guarantee* that this program has not been modified to hide any fraudulent changes to the file being examined At least with manual ledger based systems the records are visible An auditor can actually see with his own eyes and does not need the help of someone possibly corrupt to examine the computerised ledger records

Where do the computer frauds occur?

The more popular frauds tend to fall into a small number of categories They involve

- The modification of transaction files
- The modification of programs
- The modification of master files
- The theft of files

I shall use the bank example and the example of a manufacturing company to illustrate these areas again I shall concentrate on batch updating

The Bank

The transaction file in a batch updating system can be corrupted both by data entry staff or programmers singly or in collusion

Some of the earliest crimes detected involved data entry staff destroying cheques that they had written when they were returned for clearing In general frauds involving data entry staff tend to be unsubtle and easily detected it is when the programmer comes on the scene that the detection of such crimes becomes many orders of magnitude more difficult

Frauds perpetrated by programmers can be divided into the smash and grab and softly softly categories The former are the sort of crimes which remain undetected for a few days and which enable the perpetrator to escape to some sun-drenched haven with his spoils before the alarm is raised Typical of this sort of fraud is the one which was popular in the early days of data processing It involved subtracting large amounts of cash from little used accounts and adding it to the perpetrator's account It normally took only a few days for an account holder to realise what had happened but by this time the criminal had cleared his own account and fled

Crimes which come under the softly softly category are those which are very difficult to detect They enable the perpetrator to remain in his job for many years while earning him an extra income

One fraud which comes under this category is the picturesquely described salami swindle It involves shaving small amounts of cash from files and adding it to the perpetrator's account This is done by *modifying the update program itself* (Fig 3)

A classical application of this technique occurs in the calculation of interest on bank accounts The update program which normally carries out this calculation can be easily modified to subtract a

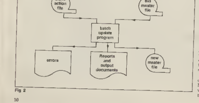


Fig 2

small amount from each interest total calculated for each account. This can then be added to the perpetrator's account. In these days of rapidly changing interest rates it would be a very unusual customer who realised that his or her interest was two or three per cent below what it should be. The salami swindle got its name not from any Italian connection, but through the fact that if you take a thin slice of salami from a long sausage it would take extreme methods to detect any change in the length of the sausage. It is this, combined with the fact that no *new* money is introduced into the system, it just being redistributed, that makes this gradual approach to computer fraud very difficult to detect.

I hope that I haven't given the impression that computer fraud is easy. Even the less secure data processing systems incorporate checks which can tax the ingenuity of even the most highly motivated criminal. As an example, many data processing batch systems perform manual checks on the transactions produced giving a total of the 'honest' transactions to be applied to a master file, the transaction file is often processed, before being processed by the update program, by a separate program which produces sub totals of the various quantities described by the transactions. Manual totals and program generated sub-totals are compared against the same totals and sub totals calculated during the update run. If there is any difference then the transaction file has been altered before being used in the update run.

Another factor that prevents computer fraud being easy is the fact that the data processing system of an enterprise is often composed of *interlocking* subsystems: introducing a change to a credit in one transaction file often means introducing a debit to another transaction file in another part of the system which means introducing

Data processing systems have become so complicated that many of the more ingenious criminals set up models of the system which they then simulate on their computer in order to examine the effect of various fraudulent changes.

Security

The Manufacturing Company

A bank is probably the most obvious place where computer fraud can occur and for this reason many d.p. systems installed in banking are highly secure. Easier pickings for the computer criminal have come from such diverse enterprises as insurance companies, local government, wholesalers and manufacturing companies.

I shall examine the case of a manufacturing company which buys materials or other finished products in order to make its own product which it sells to wholesalers.

Each division of the company maintains a number of files which are periodically updated. A **stock** file may be kept which describes the amount of materials and finished products which are kept on hand. Separate **account** files may be kept which hold details of payments to suppliers and payments from wholesalers. All these files and the corresponding **transaction** files are all sensitive to modification.

A fairly common fraud involves a member of the computer staff taking a bribe from a wholesaler to erase any trace of large quantities of finished product that has been supplied to him: this of course prevents the manufacturer billing the wholesaler.

Another common fraud is to either set up a false supplier or to act in collusion with an actual supplier and enter phoney transactions into the system so that the manufacturer sends payment out for goods that he hasn't received.

A big advantage for the computer criminal in a firm which supplies and/or receives goods is that often the fraud is only

shown up when a manual check against the firm's inventory is carried out. If the computer criminal is satisfied to defraud an amount that keeps the inventory within the allowances made for errors and employee theft then he is relatively secure.

This section of my article would not be complete without a description of one of the most audacious crimes committed, in recent years, using a computer. Many update programs produce written instructions which enable a driver to deliver goods to a specified place. One such program was being used by an American railroad firm: a programmer modified the program to route 200 freight cars to a remote location where fellow conspirators unloaded them at their leisure. Finally the programmer erased all trace of the freight cars.

The Future

Although batch processing will still be used in the eighties, the trend is towards multi-user on line systems where a large number of users interrogate and update a centralised database. This trend will create *many more* security worries.

Firstly, many more users have potential access to files.

Secondly, the centralisation of a number of files means that fewer people may be involved in a crime involving these files. In the more conventional 'sixties' and early 'seventies' data processing systems, files were scattered throughout the enterprise. Often a different employee had responsibility for each file: a crime which involved a change in one file often involved a change in many others, so a successful crime may have had to involve a large number of personnel. This usually meant that such crimes were easily detected, as it is almost a natural law that the more people involved in a crime the greater the risk that one of the perpetrators would be consumed by guilt and confess or perhaps foolishly parade the results of his fraud before other employees.

Thirdly, the use of communication lines, some of which may lie outside the

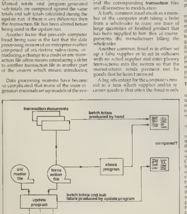


Fig 3

jurisdiction of the enterprise leads to a vulnerability which is difficult to eradicate.

Some Questions for Staff Involved in Computer Security

I have posed a number of questions which ought to be asked of anybody concerned with computer security. The list is not exhaustive, many of the questions can be split into ten or more sub questions. I have also not asked any very technical questions. However, those that I have posed are typical of those that a good security firm would start off asking on an initial visit to a computer installation.

- 1 *Do you rotate your staff?*

One of the most common and most boring jobs that a programmer has to carry out is program maintenance. This involves chasing bugs in production programs and correcting them. Often a programmer is assigned a program to maintain and is allowed to do this job for many years. An excellent way of discouraging program modification frauds is to rotate program maintenance duties. It is a strong willed criminal who will attempt a fraud when he knows that an honest programmer is to look at his program in the near future.

- 2 *How secure are your communication lines?*

Wiretap technology has reached the level where it is remarkably easy to monitor traffic along a communication line without creating any suspicion.

A typical way of gaining access to sensitive files using a wiretap is to monitor the traffic between a computer user who is allowed access to the files and the computer. When the user finishes his session at the terminal he will send a sign off signal. This signal can be interrupted and cancelled and the intruder can carry on using the computer as if he was the user who had access to the files.

Rather than try the impossible and attempt to police all the communication lines it is a more secure strategy to code all the messages that make up the traffic between the computer and a remote user. To code messages a program has to be written, usually embedded in the operating system, which codes all traffic from the computer. At the user end the normal terminal is replaced with an intelligent (programmable) terminal in which a decoding program can be embedded. For high security all messages from the user to the computer can be coded at the user end and decoded at the computer in a similar fashion.

- 3 *Who do you allow into the computer room?*

The minimum number of personnel necessary for the efficient functioning of the computer system should be allowed into the computer room. This is primarily a guard against the theft of important data which is often held on magnetic tapes in the computer room, which have a high degree of access into the computer. Also the more personnel allowed into the computer room, the greater the risk of program listings and file print-outs being stolen directly from the installation line printer.

- 4 *How good is your control of program modifications?*

A bug may have been discovered in an existing production program or a user department may request a change to a program. In order to control program modification frauds, the process whereby these changes are effected should be very carefully controlled. The change must be fully documented and authorised; it should be examined by the member of the programming team that the modifier reports to. It is important that a log be kept of all modifications.

- 5 *Are you using the password facility on your computer properly?*

Modern multi access computer systems usually demand some form of password from a user before he is able to use the computer. On many systems a facility exists whereby a file has an associated password which has to be quoted when it is to be read or written to. Theoretically this prevents access to potential users who don't know the password (wire tappers excluded of course!). Large numbers of programmers use very obvious passwords: their birthdate, their initials, their wives' christian names or the name of their pet dog. An enterprise should encourage programmers to use unidentifiable passwords or better still, issue one at regular intervals.

- 6 *What happens to old print-outs?*

A common sight in many an unlocked programmer's office is a pile, many feet high, of old print outs of programs that the programmer has been working on. Obviously, while a program is being developed the print out of the current version of the program should be retained and kept safely. All other print-outs should be shredded. Once a program is working and in production, all print outs of the program should be destroyed with only one copy being kept by a print out librarian. The print out librarian should only issue print outs on written authorisation, perhaps when a bug is being chased.

- 7 *How many copies of a file do you keep?*

Many enterprises keep at least one copy of each generation of a file. However they are usually kept in the computer room. The disadvantage of this was highlighted recently by the case of the large chemical combine which received a "tapenap" demand for the return of a series of magnetic tapes which had suddenly gone missing. It is always prudent to keep at least two copies of each file important to an organisation; one of these copies should preferably be held in a remote location by a security firm. This guards against theft and natural disaster like flooding, or instances of the recent case where a disgruntled tape librarian erased the whole magnetic tape library owned by her employers.

- 8 *Do you check that your programs do what they are intended to do?*

In any enterprise there should be an employee of sufficient seniority to cross divisional boundaries easily. He should be equipped with the computer expertise and software tools necessary to check the correct functioning of programs. This trouble shooter should be given the authorisation to run programs with test data at a moment's notice. He should also be given the authority to order program recompilations as a number of program modification frauds have involved *object level patches which have avoided using a compiler.*

- 9 *Are your management honest?*

The sight of managers inflating expense accounts and performing other misdemeanours is a morally unedifying sight. Moreover it is extremely dangerous: a programmer cannot be blamed if, on seeing such crimes go unpunished, he should attempt to do the same using the computer. If the top management in your firm are dishonest or condone bad business practice then this attitude will eventually filter down to even minor employees. Computer staff are as much saints as the rest of us, and a programmer who lightens the firm of a few hundred thousand pounds often does so as a direct consequence of the executive who lightens his firm of fifty pounds a month.

- 10 *Are you properly insured?*

A recent survey by a leading British computer security firm brought to light the fact that most computer installations are *over* insured for hazards like flood and fire which occur relatively infrequently but are *under* insured by the factor of 50% with respect to malicious damage and fraud. So check your insurance! ■

Dr. Darrel Ince is at the Faculty of Mathematics, the Open University.

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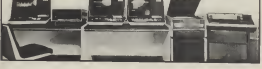

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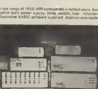

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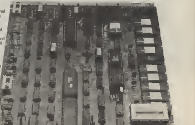

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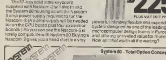

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STREET SENSE

I get more nihilistic and cynical as I get older I used to think (honestly!) that you could talk listen explain discuss and argue about important issues and that if you had a half decent argument you could persuade people of its validity

More and more, though I adopt the line taken by the person who made herself a little stamp just like the one used in that energy-conservation drive a few years ago Except her stamp instead of saying SAVE IT said SOD IT There s just not time Of course we re all well intentioned honourable people etc etc – but there s no time to waste exploring wonderfully sensitive internally consistent admirably presented wrong ideas

Alright arrogant Or it looks and sounds arrogant I'd say it s the only response that helps to keep me sane but then I would say that

I'm still shaking with anger over a bunch of loonies I met the other day Along with other people involved with design science and technology education (and quickly piling up these hats on my head instead of the artist s cap) I was invited to the Independent Broadcasting Authority to a seminar on the use of educational TV in those areas

You should have heard it With a few exceptions the educational advisers and inspectors had that grasp of 1980s design which it applied to a pocket computer would come up with a Meccano flower pot. If they were writing a symphony the notes would be wrong Any country they ran would turn into a kind of Belgian Buckinghamshire You know what I mean Yes you do

Busily creeping into the 1950s their notions of information technology and learning on a par with their taste in suits and pompous dog rhetoric they had the nerve to call me ignorant! Really

These very naughty people said just don't tell us anything about microprocessors – we're up to here with chips, look, it's all design

Is it? Let me try to tabulate what I think they say, and some of my reactions to it Doubtless I distort their views Tough

They say It is possible and desirable to (embed? discover? I really do wonder which) notions or concepts of science of design in (what they ridiculously call) real life situations Thus we need TV programmes that will help this process (by various speakers asserted educating the kids or their parents or teachers or)

This is what is wrong with what they say

> There come zooming out of all their real life situations issues such as pollution economics politics philosophy which they may or may not be equipped to deal with But they do *not* deal fully with such problems for they do not have time They are (oh yes!) *designers* eh
>
> It follows (they said it did!) from their argument that the concepts to which they advert are as applicable to the information environment to systems design to the future as to the mechanical solid lumpy concrete world that they put forward as real
>
> But that is nonsense It is why not long ago 92% of British firms said they had not even considered microtechnology It is why Industrial Design departments of colleges are running scared and mounting daft exhibitions of five year-old computing power which they think merely by being on display makes them thrusting and futuristic

These people live in work on and teach a world of chrysalides If you talk about future butterflies they'll say "it s just a continuum" Yes true but only on a deeper philosophical level (of dialectics for example) a level where if what they do and say is what we go by they never stray

In *their* sort of world butterflies fly, and chrysalides stay put

The principles which they 'find in their 'design' activity, of course were deeply spurious from the start

The answer it seems to me is that teachers communicators artists and designers must be terribly brave and get a bit of street sense The kids know Their 'ordinary' future that of their parents too will leave the teachers far behind if they re not careful Street-sense Street design, street information technology Does it sound odd to say it? Is there a new word?

The other day I saw a wall size colour display that showed amongst many other things a TV set a telephone, a desk with books and papers on it The display was voice, touch and gesture-sensitive You could push the buttons on the picture of the telephone and make a real phone call in real time to a real person You could zoom into and *through* the books and papers The picture of a TV set worked showing real programs again in real time or miles of video-disc recording organised by computer

The design of such systems of education, research industrial and fun uses of them, is not much to do with most design [illegible] That is [illegible] hat [illegible] h in [illegible]

Well [illegible] did [illegible] afterwards [illegible]

[illegible] ment [illegible] coloured [illegible] teachers [illegible] kept showing [illegible] and stuff that [illegible] had gone before You [illegible] how it was I felt cheated [illegible] models of ways of dealing [illegible] showed me Now it's the [illegible] of you I've changed – son [illegible] have not But – you're the teachers [illegible] does it feel? Bye-bye clockwork persons Back to the streets!

And hello all of you who sent in entries for the Gregory Bateson competition Including Gregory Bateson who wrote me an eight-page letter full of ideas, and rather nicely saying that mine had been the only review of his book that had come close to what he was on about (A cruel friend suggested mine had been the only review which hadn't torn him to pieces!) His letter ended by saying that if he won the competition he didn't want the prize (his book) as he'd got one

I hear too that in response to my second, Gambian, competition someone has written a whole interpreter to run on my Research Machines computer

The winner of the Bateson book 'Mind and Nature' however is Peter Head of Ealing, London I should also mention Illy the Fish Publications – but I won't

Well alright then They're at 57 Myrtledene Road London SE2 0EU and you will know what to do

Mr Head's theme which I hope to return to in a later issue is that *process* is the thing for example the idea of squareness being defined by a procedure for producing a square I believe Plato refuted this as the source of *all* knowledge but it sure helps

A few weeks ago to change the subject, I attended the Viewdata 80 conference at Wembley I've been interested in Prestel ever since I was asked to take part in a project looking at the potential of the system for the visual arts (After many fasci-

Discourse

nating hours at an editing terminal I concluded that the system or process – hierarchies and heterarchies of 'pages' of information graphics etc, – could be used rather than the graphics themselves)

A degree of interaction is achievable, beyond mere button pressing The point about viewdata systems that often seems to be missed is that such systems are not really about giving information – since what they tell you is of necessity nearly always incomplete an outline Rather they are a way of relating and structuring ideas It's the structure and dynamics which grow important rather than the contents *per se* You have a conversation with yourself mediated by the system which in some way acts as a kind of cognitive mirror

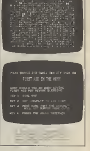
The thing that really grabbed my attention was on the Oracle (ITV's teletext) stand. There they demonstrated rudimentary tele software And the point was you could *manipulate all the normal teletext functions* from within a BASIC program (I found this out by playing with it – do they know this? Yes of course they must)

That surely is exciting Think now about what might come creeping into your living-room TV – what you could do with models and simulations Imagine the Chancellor getting up and giving, not a Budget but a computer program Party political broadcasts send their version of an economic model down the line Etcetera!

Finally something from the Royal College of Art's computer studio Want a cheap digitiser? Just get a cheapo black and white TV camera feed it into your computer display getting one or two things right and trace the display using some sort of cursor!

Our Sigma colour system uses separate red green and blue inputs, we can shove a black and white picture from a camera (or ?) in one of them leaving normal colour (tinged blue) on the screen.

In the coming year I shall try to produce some really useful stuff using video and computers jointly to do the things (which by now you can guess) that I want to It's anything's worthwhile Did you see that guy in the nuclear-sheltered Regional Seat of Government on TV? My latest computer-generated video work is called 'Nuclear War at the RCA It's very pretty based on the fact that if there ever is such a war the RCA will paint it or moan about the design of it ■



FIRST AID IN THE HOME

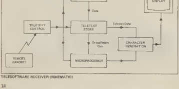
WHAT SHOULD YOU DO WHEN GIVING FIRST AID FOR SEVERE BLEEDING

KEY 1 DIAL 999

KEY 2 GET CASUALTY TO LIE DOWN

KEY 3 MAKE SURE THAT THE CASUALTY WILL NOT SUFFER MORE CUTS

KEY 4 PRESS THE WOUND TOGETHER



TELESOFTWARE RECEIVER (SCHEMATIC)

Appendix – ITV's Telesoftware

Telesoftware is an interesting development on the viewdata scene The following account of the ITV/ ORACLE/TELESOFTWARE concept has been taken in its entirety from an ITV brochure Editor

TELESOFTWARE represents a new way of using the ORACLE teletext service to broadcast not only news and information but also computer software which may enable future teletext users to play games calculate mortgages and tax returns take educational courses and much more than that.

The electronic signals which provide the teletext information are carried with the normal television programmes, and are very similar to those used in computer technology By replacing some pages of written text with pages of computer programming, a user has simply to select the TELESOFTWARE program of his choice by choosing an ORACLE page And like the information pages on ORACLE TELESOFTWARE programs would be entirely free

You won't need a sophisticated computer system to receive TELESOFTWARE programs at home or at work In fact teletext receivers already contain most of the essential parts of a simple computer Adding a microprocessor to a teletext receiver will enable it to decode and execute TELESOFTWARE programs in addition to receiving the normal ORACLE information No special technical knowledge will be needed – operating TELESOFTWARE will be as easy as selecting the pages on ORACLE Cassettes discs and telephone calls to distant computers will be unnecessary With TELESOFT

WARE all the computing is done inside the receiver

The application of TELESOFTWARE will be limited only by the imagination of the programmers. For instance it could provide a wide range of video games or become a highly specialised but simple to use calculator ready to deal with mortgage repayments VAT and electricity consumption or it could be used as a flexible educational unit for programmed learning packages which may be learnt as fast as slowly or as often as required by the individual

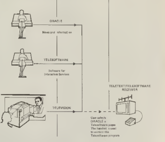
TELESOFTWARE may also in future permit ORACLE receivers to display high definition graphics and even foreign language alphabets such as Greek or Russian

In co operation with ITV engineers the Mullard Application Laboratory has designed and built the first experimental TELESOFTWARE receiver Using this receiver with ORACLE broadcasting the experimental programs they have been able to show that TELESOFTWARE represents a viable and cost-effective method of bringing simple to-use computing methods to the general public

A TELESOFTWARE facility will it is expected add only a modest amount to the cost of a teletext receiver when in mass production

Further research is already progressing to establish compatible standards for a future TELESOFTWARE service ITV engineers are investigating many applications for the system including its use in education which is being given a particularly high priority It is hoped that, in the future TELESOFTWARE could become as essential a part of ITV s ORACLE service as the news headlines or weather forecast offering the viewer even better value for money from INDEPENDENT TELEVISION

For further information about ORACLE contact Engineering Information Service Independent Broadcasting Authority Crawley Court, Winchester Hants SO21 2QA Tel Winchester (0967) 822444 or if you prefer Tel 01 584 7011 and ask for Engineering Information


ITV STUDIOS
ITV TRANSMITTER NETWORK
VIEWER S HOME OR OFFICE
ORACLE
News and information
TELESOFTWARE
Software for Interactive Services
TELEVISION
TELETEXT/TELESOFTWARE RECEIVER
User selects ORACLE or Telesoftware pages The handset is used to control the Telesoftware program

TELESOFTWARE TRANSMISSION SYSTEM

Information is power . . .

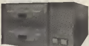
. but disorganised data and jumbles of paper mean that your business is running at less than its best.

Mutek offer an *Ohio Scientific* solution

Database Management Systems bring those information problems under control.

We specialise in small database management systems — and small refers to the cost, not the performance, with machines capable of handling up to 300 Mbytes of hard-disc storage with full networking abilities That's around 150,000 text pages instantly retrievable from any of up to sixteen terminals — the electronic filing cabinet!

Ohio Scientific systems combine this with computing abilities that are better than most — better and simpler expansion, faster operation, lower overall cost For *real* computing — large databases, industrial control and data acquisition, high speed processing — and solutions that won't break your budget, Ohio Scientific from Mutek is your first choice



[illegible] C2 OEM
[illegible]75 excl VAT) expands easily up to a full multi user specification

Experience counts

Ohio Scientific are the market leaders in database management computer systems, and all our staff have had plenty of experience in the hardware and software aspects of the computer industry We have used Ohio Scientific computer systems in a wide range of applications — let us show you how these superb systems can be used in your application

We supply solutions

not just the hardware! Call us and talk to our engineers and programmers for practical answers to your questions

Mutek — *real* database management . . . for less than you expect

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Ilford
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Birmingham
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Manchester
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Nottingham
[illegible]

Glasgow
[illegible]

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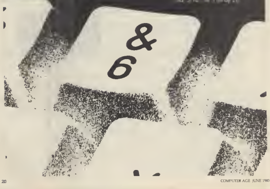


In a high [illegible] water is poured expertly [illegible] song and dance act. For a balancing piece of information, see the Appendix to Brian Reffin Smith's article in this issue

VIEWDATA 80

An awed appraisal

Confused might be a better word. Viewdata 80, an exhibition held at the undersized Wembley Conference Centre in the last week of March, and organised by Online Conferences Ltd, demonstrated amply that whatever 'public service' motive the drive towards electronic information access may have had, it's become a commercial Klondyke that makes the infamous 'Licence to print money' days of commercial television seem but a blackhead on the nose of the unacceptable face of Capitalism.

It took me three days to figure out quite why it was that so many different firms seemed to be peddling pretty well the same things there at Wembley. Phrases like "Impacts trading position of every enterprise" – which is the keynote to the biggest load of Public Relationspeak drivel I think there's ever been (give up counting the split infinitives), printed on behalf of Rediffusion's REDIFON office-of-the future system – tend to confuse the average Joe Journalist, especially when he's surrounded by lots of glittering hardware. After all, if you stick a typewriter keyboard on the front of a TV set, you could be any old TV critic.

But the answer isn't as futuristic as the idea of a publicly accessable national electronic information service; no Sir. What the Communications Revolution is all about is Money, plain old-fashioned notes of sterling green.

The principle of Teletext is rather like the method adopted by my local London Transport station for managing their rather small car park. In the face of a perpetual demand for park-and-ride, but having flogged off much of their land to commercial developers, they hit upon the solution of issuing season tickets for cars. Now, each space has its own registration number corresponding with that of the lucky commuter who got there first. All spaces have now been secured for life by a handful of people with the money to pay for them. Casual travellers whose registration numbers fail to coincide with those of the spaces tend to get towed away.

Prestel (the Post Office's national data service) tends to the same Biblical philosophy.

Say you're a medium sized firm with your nose in the communications trough. You publish a few textbooks, a few part works, you have shares in the odd commercial radio or TV station, you offer the odd business information facility, either by Telex or by this newfangled Visual Display Unit system, via expensive Post Office lines. Along come the Prestel boffins, preceded by a chorus of overblown Media freaks bearing glasses of cheap white wine.

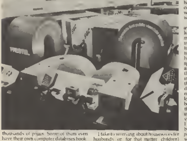
'We can enable the public to access any information you can provide. We can also offer private channels to business. One day, if the filthy French and the [illegible]-

mous Boche see reason we can splurge your data all over Europe We can even give you a box with buttons on it so you can play with your own pictures What say we do this for Britain?

You seize the opportunity with both hands, vaguely noticing on the way that the Post Office will only rent you a minimum of two thousand frames direct But at these prices you can always find something to frame

Commentary

A 22 TV receiver equipped with Ceefax Oracle and Prestel services will rent for around £25 a month To have the nearest thing the public will ever have to a real computer terminal in their living room, that s not a lot of money After all the whole BBC only costs £34 a year and you can t talk back to it! The basic Prestel service includes a key pad that makes limited programming possible – the insertion of order and credit card numbers for instance



Two things then occur to you Further up the line there are large organisations some of them Governmental some of them multinational (quasi-Governmental) who own – sorry control – literally thousands of pages Some of them even have their own computer databases hooked into the same system On the other hand, there are small firms with anything from one to one thousand frames, further down the line Like a chain letter money starts pouring through from the little guys to the big guys and you re in the middle It's whoopee time! The beauty of the system is that the Public are going to pay for it just like with commercial TV The more the public wants Prestel the higher go your rates for leasing your spare frames

This is the key to the profitability of the system, and it is one of the reasons Prestel are punting the system so hard around the TV dealers and rental agents and spending heavily on media The other two reasons are negative – April Fool s Day saw the ending of the PO monopolies governing phone installations and the September 79 launch of Prestel was one of the marketing cockups of the decade As one Rental firm manager said at Viewdata 80 "They re pushing so hard! A while ago I asked for an extension phone at one of our branches Three months went by and nothing But when I asked for a demonstration Prestel model it was connected up to the telephone line in five days I said 'How come you can do this, but you can t put in an extension?' Next week I had my phone "

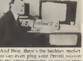
I take to worrying about housewives (or husbands or for that matter children) slumped in front of their TV sets, Swiss valium coursing through their veins, just ordering goods from Littlewoods because they've got nothing better to do It's so easy Instant credit without leaving the living room Where is the money going to come from? Where, indeed, are the delivery drivers going to come from?

And what in a child s mind is going to be the difference between programming Prestel in response to computer game questions, and ordering goods? Who will prevent mail order houses imitating 'Game copy in order to play down the distinction? For 'User friendly' read 'Caveat emptor'

Prestel – sorry to keep harping on about Prestel I'll come to Telematique in a minute but Prestel did rather steal the show – also has its private side The same system is amenable to parallel restricted access databases provided, I would think at some expense by private companies using their own databanks Firms can also rent into parts of the public service that, by virtue of their having been leased by primary business can be electronically marked "Private – trespassers will be prosecuted" Thousands of pages of Prestel are being made available to companies looking for restricted access services Typical of this is the GEC private viewdata service using Prestel terminals but accessible only by password Doubtless there'll be quite a black market in current Shibboleths to replace moonlighting in the monetarist economy of the 80s

Or then, there s the quasi-public service of specialised rather than restricted information like the National Building Agency s CONTEL service Partly sponsored by the Department of the Environment, CONTEL is available to designers, architects local authority clerks of works, building firms and employers, anyone in the building industry (what building industry? – *author*) to provide them with up to-date information on standards regulations, cost and availability of materials basic designs, and even extracts from Jobcentre files, probably, indicating the whereabouts of labour – in this case, out of work machinists

While there are limited teletext services available already business and stock market services springing immediately to mind – some companies are already cashing in on the relative cheapness of an information network accessible by existing telephone lines Haymarket Publications have leased space to offer clients both specialised information in the Advertising and Marketing business and access to their own frames for advertising and other information purposes At the moment, the service is startlingly cheap One standard frame costs thirty pounds for six months including preparation of text and logo – and amending the text which can be done by phone costs as little as 50p But the Campaign & Marketing' service is going to get more expensive as the potential viewership increases Testing their service, I punched up the JICTAR ratings (which, because they come out the day after *Campaign* magazine goes to press tend to be a week old) to find that they were two weeks old! 'Oh that's just the wrong date ' Sorry to gloat chaps but there s nothing like high tech, to give a low journo an inferiority complex



And then there s the facilities market You can even plug your Prestel receiver into the office computer so you can store and retrieve the information you want to present Or why not have a machine that gives you a hard copy on paper of what you've got on your screen? And how about a few extra monitors around the building?

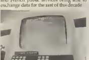
Facilities available to the business user of the Prestel network come in a variety of manufactures all calculated to out perform the Post Office hardware yet all ped dling the same basic keyboard Sorry I didn't mean BASIC these are alpha numeric According to Les Hayden of Systems Technology a London based software consultancy who don't do so badly marketing Telemachus hardware either – the advantages of going private are speed of access – the Post Office can't guarantee you a half hour wait to change your frame – and flexibility Their Prestel compatible system based on the DEC PDP 11 range of computers gives you roughly twice as many combinations of colours characters lines and margins Or there's the Kirby-Lester business system based on the PCT 14 display unit This firm based in Oldham, offer the unit with a built in alphanumeric keyboard extending to a hard-copy printer and tape storage unit, as well as the KL Editing Keyboard with the usual variety of graphic effects and with a microcomputer addition promised in the near future A measure of the speed with which this technology is moving is that their first Prestel compatible unit Antares operated in black and white only and has been replaced after just twelve months!

The French have carried their marketing strategy a stage further than Prestel The big idea is to get thirty million – yes thirty million – Viewdata sets into French homes in the next nine years How? By incorporating the national telephone directory in the system that's how As with Prestel La Telematique combines data processing and telecommunications to offer a range of service to the private and business subscriber One or two of those services are, at present ahead of Prestel technology

For a start the French system uses more dots to the sub-block than Prestel giving better definition But then they had two years to think about it Then there's Tele writing which allows you to write on an ordinary sheet of paper and have the lines faithfully reproduced in the colour of your choice on the television monitor Since we're in the business of ugly words try Compunication for size That's Telematique's blanket word for the marriage of computers with telephones Their Antiope standard Teletel service starts up later this year on a limited test transmission to Velizy in the suburbs of Paris The key to their success is to go for mass produced low-cost (about 400 FF or £45) black and white electronic directory units – which are also capable of receiving other Teletel services Developed in the CCETT laboratories at Reims Videotex (all these names for one basic system!) is a marriage of public and private enterprise You would

Commentary

think they'd have made it so that it would interface with systems in other countries, but no Nor do the Telematique people think there is any likelihood of the British and French public services being able to exchange data for the rest of this decade



CCETT by the way, are now working on a fiendish little black wafer that produces semi automatic graphics You draw the outline it blocks it in with the colour you want it also stores outlines On the market in France next year and looking for an outlet here Animators may like to know that with stop-frame VCR editing, they could probably work direct onto videotape although they're limited to 8 colours at present

And what of our friends in Japan? Well their CAPTAIN system stand showed us some impressively contrasting colour graphics though a dearth of imaginative uses for them They hope to start testing their Teletext system next year, and CAPTAIN seems to be the winner as it has sufficiently good diagonal resolution of line to be able to reproduce Chinese (Kanji) as well as Japanese calligraphy The complexities of this are probably what has held them up

CAPTAIN stands for Character and Pattern Telephone Access Information Who said the Oriental mind wasn't ingenious? Developed by Nippon Telegraph and Telephone Public Corporation CAPTAIN supersedes the standard mosaic pattern of computer graphics with a dot matrix Its colours are better than those of Prestel, more real

But what no foreign system does – and a prototype was on display at Viewdata 80 is to compete with Prestel's experimental ability to reproduce pictures

Despite the limitations of the display computer – 64K – Prestel feel there's sufficient capacity to enable the scanning raster to build up slowly line-by line, a low definition colour picture covering about a third of the frame size – a picture which is nevertheless more identifiably a hamburger washing machine or motor car than the computer graphic simulation At the moment it's a gimmick and a crude one at that But as line and computer capacity increase movement will become possible And – although the Prestel systems men hadn't thought of it why rule out digital sound transmission?

This is where things start to take off once again Because if you can squeeze text

picture and sound down a [illegible] Hz telephone line, why bother to transmit television programmes at all? It's the same thing The only difference is that by the time technology permits us to do this there'll be well over a million separate frames in use on the Prestel network alone Or, to put it another way over a million separate 'TV channels – all in private use

If this extraordinary prospect seems fanciful, don't forget those Mariner and Voyager spacecraft pictures were far worse than 'phone' quality before computer enhancement and System X will improve quality dramatically Digital transmission techniques being developed by the BBC would be capable of considerable enhancement Why stop at advertising your Hi Fi goods and prices? You could demonstrate them in peoples homes Why stop at marching through Southall? The National Front could just as easily rent a Prestel frame at thirty quid for six months, with unlimited update

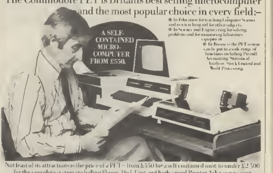
Who is going to control what could within a very few years, be the televised equivalent of Citizens Band radio? Okey there's so much of it that no one would be able to receive any one broadcast by accident. But there are ways of publicising frame numbers that could appeal to the curious We all saw what happened recently when one Prestel user jokingly included a page giving a 'Guide to Dirty Bookshops in Soho Where does that kind of freedom to inform stop? It certainly can't fall within the legal framework that exists at present to control the excesses of BBC and IBA programme makers And where does CB television leave them? Video cassette recorders have already freed thousands from the tyranny of the programme scheduler and there's been no response from the programme companies (who should by now be into secondary marketing) whatever except to mutter vaguely about special levies on blank cassettes which the record industry have failed to obtain after ten years hard lobbying

It's all very well to say this is to the good, and that the peculiar power of the media will fall increasingly into the hands of the many, thanks to the ubiquitous micro But who already has the stranglehold on this new medium? As you go back along the chain of proprietorship of the pages of Prestel, progressing from small database to large who do we find in control of this wondrous new outlet? Yes it's the same old multinationals who brought you the Twentieth Century

Hurry now while stocks last! ■

Your Commodore PET System

The Commodore PET is Britain's best selling microcomputer and the most popular choice in every field:–



- ✱ In Education for teaching Computer Science and as a teaching aid for other subjects.
- ✱ In Science and Engineering for solving problems and for monitoring laboratory equipment.
- ✱ In Business the PET system can be put to a wide range of functions including Payroll Accounting, Statistical Analysis, Stock Control and Word Processing.

Not least of its attractions is the price of a PET – from £550 for a self contained unit to under £2 500 for the complete system including Floppy Disk Unit and high speed Printer. Ask your nearest Commodore dealer below for details about Commodore hardware, software and training courses

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Capital Computer Systems W1 637 5551
ACE (by Top TV Ltd) SW1 720 1785
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Micro computation Southgate 882 5104

HOME COUNTIES

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[illegible] Ltd CHESHAM 4441
J. R. Ward Computers Ltd MILTON KEYNES 562850
[illegible] Ltd COLCHESTER [illegible]
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[illegible], BRENTWOOD 231488
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Mega Computers Ltd CATERHAM 49235
[illegible] CAMBRIDGE [illegible]
[illegible] OXFORD 722[illegible]
[illegible] Services Ltd WOKING 71638/21220
Business Electronics SOUTHAMPTON 738248
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Bromwall Data Services Ltd HATFIELD 60505/64001
MMS Computer Systems BEDFORD 40601
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Sumlock Bondain NORWICH 26259
CSE (Computers) READING 61492
Dataview Computer Systems WOODSTOCK 811925

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Hallbrook Business Systems DERBY 366600
[illegible] Electronics Ltd [illegible] 2117
[illegible] Ltd DERBY [illegible]
[illegible] Processing [illegible] 255
[illegible] 01263
[illegible] Computer Systems [illegible] 27
[illegible] Computer Systems Ltd [illegible] 913544
Allen Computers GRIMSBY 40568
CPS (Data Systems) Ltd BIRMINGHAM 372 5686
[illegible] BIRMINGHAM 328 5249
[illegible] (Computer Systems) Ltd WOLVERHAMPTON [illegible]

YORKSHIRE & NTH HUMBERSIDE

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[illegible] Computers, HULL 558187
Computer [illegible] LEEDS 398998
[illegible] Computer Systems Ltd SHEFFIELD 662125
[illegible] BRADFORD 20135
[illegible] Centre SHEFFIELD 585490
Yorkshire Electronics Services Ltd MORLEY 522181
[illegible] Computer Centre [illegible]

NORTH EAST

[illegible] GATESHEAD 724648
[illegible] GATESHEAD [illegible]
[illegible] Systems SUNDERLAND 23[illegible]
Newcastle Computer Services NEWCASTLE UPON TYNE (0632) 615325

SOUTH WALES & WEST COUNTRY

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A. C. Systems EXETER 71718
Computer [illegible] SWANSEA 290047
Sigma Systems Ltd, CARDIFF 21515
Devon Computers PAIGNTON 526303
[illegible] Computer Centre BRISTOL 23087
J. A. D. Integrated Services PLYMOUTH 62616
Sumlock Tabdown Ltd, BRISTOL 26685
Radan Computational Ltd BATH 318483
[illegible] 422052

NORTH WEST & NORTH WALES

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COMPUTER LIVELINESS

What's up doc? Computerised antics in the land of Gustavus Adolphus

Animation can be child's play, according to Alan Kitching of Grove Park Animations Ltd, Camberwell London

He was referring to a software package he had developed called ANTICS which has worked on a shared machine on Swedish television for the past two years The cost of developing a prototype of the machine Mr Kitching said was £450 000 but he expects to sell models of the prototype at about £250 000 That is a lot of money and proved too costly for both BBC Television and the I T V companies to both of whom Mr Kitching offered the complete package

As it is the computer Swedish T V has is used also for studio booking and accounts and can only be employed on Mr Kitching's work at night and at week-ends where there is a company lull in accountancy and bookings

Fortunately ANTICS can work on machinery already installed at an establishment. All that is needed is a good microprocessor with a Tektronix 4014 display and a graphics tablet ANTICS is a method of putting some animations into the operator's work In particular it affords immense potential for operations working in T V and education

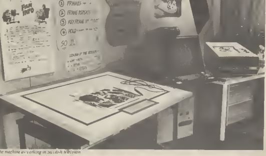
What Mr Kitching described as a "Stone-Age" package consists of a suite of 7 programmes all written in Fortran for ease of implementation Once installed routines can be re written in machine code routines applicable to your own machine

The complete software package contains about 500 routines plus about 30 back end routines that are specific to individual devices or operating systems If however you don't have back-end routines made for your particular machine the studios will supply full specifications for writing them yourself

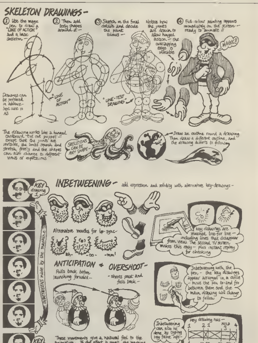
The software package first asks the user what he or she wants to do then automatically loads the correct programme with the appropriate files Drawings are then proceeded with by using a magnetic pen That is to say as drawings are done on the magnetic tablet, the picture appears at the same time on the screen and is automatically stored inside the memory of the machine One can either draw freehand straight into the machine or prepare the drawings in advance and trace them if that approach is preferred

Drawings can be done either by pressing the magnetic pen constantly or by using the dot to dot method The machine automatically joins each successive dot with a straight line a particularly useful function if a drawing contains several straight lines All one has to do then is dot the ends and the line appears automatically

The drawing board has a chart containing instructions – how to alter drawings for instance, how to repeat them a time saving device, as many people who have attempted action cartoons will appreciate The instructions also include how to erase a line or an entire sketch, how to alter an image, how to insert a required detail how to copy a drawing from store how to draw geometrical shapes such as circles squares angles, polygons and stars which makes it easy to improvise directly on the machine and obtain complex features from simple drawings Colours can be changed and the thickness of the pen



The machine as working in Swedish television


SKELETON DRAWINGS -
① Use the magic pen to draw a "LINE OF ACTION" and a basic skeleton -
② Then add body shapes around it -
③ Sketch in the final details and decide the paint colours -
Notice how the joints are drawn to allow hinged action - the overlapping edge is invisible
④ Full colour painting appears immediately on the screen - ready to animate !!
MAGIC!!
Drawings can be prepared in advance - best size is A3
"LINE OF ACTION"
"LINE-TEST DRAWING"
The drawing works like a hinged cardboard "cut out" puppet - except that the joints are invisible, the limbs squash and stretch freely and the shapes can also change to different views or expressions
SKELETONS CAN BE ANY SHAPE -
Draw an outline round a drawing Then draw a different outline, and the drawing distorts to follow
INBETWEENING - add expression and solidity with alternative key-drawings -
KEY drawing 1
INBETWEENS made by the machine
KEY drawing 2
Alternative mouths for lip-sync -
ah-
-oo-
-mm!
Key drawings are matched line-for line - including lines that disappear from view. The second TV screen makes this easy - plus instant replay for checking
ANTICIPATION + OVERSHOOT -
Pulls back before launching forward -
- shoots past and falls back -
Inbetweening with the pen - the key drawings appear arranged in a circle - move the pen to-and fro between them and the main drawing will change to follow
Inbetweening can also be done by typing key frame info -
Key drawing nos -
1
2
1
HOLD 3
4
1
13
17
27
35
40
frame nos
These movements give a natural feel to the animation. If the effect is small, the machine can do it. For greater emphasis, an extra key position is put in. Inbetweens can be evenly spaced, or smoothly cushioned.

Drawings done on the machine

altered at any time while drawing or after the drawing is finished. They are selected from the printed examples of a choice of 700 colours. One can see the finished result on the colour screen at any time and, if necessary, change whatever one sees.

Any drawing can be given a simplified skeleton structure. Animation can then be done by animating the skeletons. The skeleton can be like a hinged matchstick figure or it can be a grid pattern of any shape, or, if you wish, can be a combination of the two. The limbs can be squashed and structured to any degree, the shapes themselves can be independently animated in any way to give varying expressions. ANTICS animation works, in fact, by a combination of 3 principles: skeletons, sketches and effects. Skeleton animation allows a detailed drawing to be animated by giving it a simplified skeleton or grid structure. Then it draws a series of key positions of these. The machine fills in smooth movement and astonishingly enough fits all the flesh to the bones!

With skilful handling, the package allows 3D drawings to be done and one can compose captions from any typeface

Animation

simply by typing the wording on the keyboard of the machine. The resultant text can then be combined with any other drawing for use in animation. Letterings can be in any range of colours and there are full facilities for italics if needed. Three typefaces are supplied, but you can draw any new typeface you wish by using the "Draw" programme.

To those who so far have not worked in animation the package gives the 5 principal ways to animate which untutored operators will find instructive and useful. They also include camera effects. But whereas conventional cameras can zoom up to a ratio of 20 in 1, with the package 10,000 to 1 zoom can be achieved. Like all effects, the zoom can be animated by all of the usual methods – drawing board, key frames (all of which are explained in the manual which goes with the package), "random" or wave motion or tagged to the movement of another drawing.

The whole ANTICS system is to enable animations or would be animators and designers to produce complete full colour animation sequences in a few tedious hours with a quality of animation equal to tedious hand drawn techniques. In fact little, if any, computer knowledge is needed to use the package.

In Sweden, Mr Kitching said, about a hundred people had been to play with the "Stone Age" machine. They had included animators, artists, designers, producers, typists and even frequenters of cafes and bars. One wonders what the imbibers thought when the saw their drawn skeletons take on clothing automatically!

It is an amazing package but one wonders if computer professionals will take it seriously or treat it as the toy Mr Kitching, at one point, referred to it. The vast sum to build a machine – nearly half a million pounds – should outlaw it for any but the wealthiest corporations. But the package at £4,000 may well be in reach of educational authorities, hospitals and engineering concerns despite Government spending cuts. ■

The author is a correspondent of the BBC World Service Science Unit

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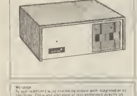

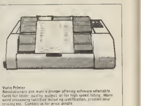

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C TO THE POWER OF THREE

Two technologies which are rapidly growing together are Video and Microcomputers. Julian Allason, who spent six years working in the video industry before founding the Petsoft micro software house, reports on some surprising consequences of this union

The shotgun wedding is not an ideal start to a happy marriage. But when two sets of outstandingly wealthy parents stake a large part of their fortunes on the success of the union, failure becomes unthinkable.

And that is exactly the situation which prevails today, as some of the world's largest corporations link themselves in a series of extraordinary marriages: Philips to MCA, MCA to IBM, IBM to Comsat General and so on. (MCA stands for Music Corporation of America, IBM for International Business Machines – **Editor**)

Sky Scraper View

These relatively unpublicised agreements also explain why some of the giants of the electronics world have held back from the headlong rush into microcomputers. The view from the 120th floor is a little different, it seems.

These are companies with interests that span many rapidly growing technologies. But it is in communications that growth has been most marked, and the cost of participation highest. It is only natural then that there should be moves to integrate development work in different fields. Where this means driving together such diverse technologies as video and microcomputers, the swapping of technical knowhow — and patents – is inevitable.

Complete Communications Centres

There are four technologies of which microcomputers and video are but two that are being drawn together to produce a single product which will change our lives. That product is the Complete Communications Centre, or C^3 in industry jargon. C^3 is a microcomputer with embedded modem, video screen, printer, solid state RAM memory and video disc storage unit combined. With it you will be able to conduct almost all normal business functions from home. Specifically it will transmit and receive electronic mail, voice, computer data and video pictures over an integrated communications network.

Individually these technologies are well developed, and with the possible exceptions of electronic mail and viewdata, already in widespread use. Combined they form an instrument substantially more powerful than the sum of its parts.

Intelligent Networks

Most readers of *Computer Age* will have an indication of the capabilities of microcomputers. In past issues mention has also been made of Micro-networking. This is the term used to describe the workings of several American communications networks which allow the owners of individual microcomputers to transmit text, data, even applications software to one another at low cost. The best known of these is MicroNet. Microcomputers hooked into the networks may also be used to access information sources like the *New York Times* Database. Individual software houses are starting micro - networking their wares, programs sold in this way being known as telesoftware. (See Appendix to Brian Reffin Smith's article, this issue – **Editor**)

In the world of large computers, established Intelligent Networks operated by Tymnet and GTE-Telenet allow incompatible devices from different manufacturers to talk to one another. However, it is the imminent arrival of networks capable of handling *all* four types of information which will bring C^3 to life. Both Xerox and Satellite Business Systems (in which IBM is a partner) are due to commence operations in about six months time.

Satellite Business Systems, for example, will integrate voice, data and video nets into single digital bit streams. To handle the volume of information involved, SBS are launching a number of satellites capable of re-broadcasting messages at extremely high frequencies.

Video Cassette

To all intents and purposes video reached this country in 1972 when Philips launched their N1500 Video Cassette Recorder. It recorded and played back television programmes lasting up to one hour. Alas, VCR was dogged by teething problems and overpriced for the consumer market. Despite initial enthusiasm, domestic video never really took off, largely because of overpricing and regular format changes, resulting in a lack of prepackaged software. This chicken and egg situation has only recently been resolved with the arrival of the VHS recording system that has claimed some 70% of the U.K. market. Interestingly there are now an almost equal number of VCRs and microcomputers in Britain – around 110 000 of each according to the latest estimates.

Video Disc

These painful lessons appear to have been learned by most of the manufacturers. Few of them expected video tape to survive as a medium for any great length of time. Even as they were launching the video cassette recorder, Philips had a video disc under development. Yet the VLP Disc System will not reach Britain until next year.

On a recent trip to the United States I had an opportunity to examine the Magnavox VLP player, assembled over there from Philips components. Its application to microcomputers and C^3 was immediately apparent.

The disc is identical in size to an audio LP, and gives a playing time of 30 minutes per side. At present the system offers playback only, and I was offered a choice of films in twin disc packs for around $30. MCA Discovision have since introduced extended play discs with one hour playing time per side.

Ruby Laser

The disc rotates at high speed and is read not by a stylus but optically from underneath by light from a small gas laser. Each revolution of the disc provides a complete colour frame of information, allowing slow or fast motion or freeze-frame, without loss of definition. An index control allows display of the frame number in the top left hand corner of the screen up to a maximum of 54 000.

At present, video disc is a Read-Only

device although experimental read/write discs are under development Its significance lies in the ability to retrieve large volumes of information stored in an inexpensive medium

APPLE Link

Already VLP has been linked to an APPLE II microcomputer at Utah State University where it was found possible to retrieve a single frame at random in an average 2 5 seconds Searching the entire side equivalent to 7 5 megabytes of store was accomplished in only five seconds

At present the only source of video discs is a company called Disco-Vision Associates set up jointly by MCA – already in partnership with Philips – and IBM MCA are already involved with Pioneer (part of Universal) in marketing a somewhat more sophisticated video disc player than the Philips/Magnavox machine

The IBM Factor

IBM s contribution to Disco-Vision Associates has been a number of patents covering methods of increasing recording density on video discs and quite a lot of cash Their decision to become an active participant in Disco Vision underlines the importance of the new medium to the future of computing A more usual IBM procedure would have been to grant a licence to utilize its patents

Several Japanese companies are also known to be working on C^3 – Sharp have even shown a prototype But for the time being at least the impetus remains with the Americans and the first C^3 systems will

probably appear around the middle of next year

Specification

The exact composition of the C^3 terminal is likely to depend on the bias of the originator Xerox will no doubt be building copy/facsimile capability into their version Most systems will be video based with a viewdata facility and a screen printer Online store is likely to come in the form of Winchester Technology hard discs with tape cartridge or floppy back-up, initially

> *'Another effect of C^3 will be to blur the boundaries between office and home'*

It is anticipated that video disc will take over as read/write facility becomes available at reasonable cost

Does this mean we should delay purchasing a microcomputer now? Alas no as the first C^3 units are (optimistically) a year away and – if IBM have anything to do with it – likely to be expensive when they do arrive

C^3 has far reaching implications for all of us In the office it will mean mail that arrives at its destination within twenty minutes of its transmission as opposed to the nearly two days now taken by the average letter This in itself is likely to affect the pace at which business is conducted it may also serve to increase the amount of stress on decision makers One can only hope that the automation of filing and other routine office chores will compensate

Returning to my hotel after a night out in Tokyo not long ago I noticed a facsimile machine buzzing away in the lobby As part of an experiment the morning newspaper was being transmitted over telephone lines direct to its readers The quality of text and photographs was at least as good as Fleet Street printing Future issues of *Computer Age* may well be printed in your own living room

Another effect of C^3 will be to blur the boundaries between office and home The existence of large amounts of reference information on video disc plus the ability to access remote databases and to communicate with other computers will mean that many people will no longer need to go to work, it will come to them In an age of rapidly rising transport costs computing will make better sense than commuting ■

Editor's Note *A recent decision by the U S Federal Communications Commission has unfettered the hands of the American corporation ATT a megacolossus whose profits alone approach a billion dollars a quarter The consequences of its entry into the C^3 business are incalculable*

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SILVICULTURE & COMPUTER BASED LEARNING

The growth of CEDAR

Centres of expertise, advice and information are dotted all over Britain. Here is the story of one of them.

The CEDAR Project at Imperial College was set up at the end of 1977 primarily to take advantage of the wealth of computer based learning materials developed under the aegis of the National Development Programme for Computer Assisted Learning.

The National Development Programme which ran for five years from 1973-77, not only provided substantial funds for computer based learning (CBL) projects in the United Kingdom but also acted as a catalyst for other CBL work approximately £5 million was spent on development during this period and by the Spring of 1978 an index of CBL materials available in the UK listed some 500 programs and packages. For historical reasons the greater part of this material was intended for use in tertiary education and in science and technology subjects because this is where the majority of the computing facilities and expertise were concentrated at the time. (Over the past few years of course, this imbalance between higher and other sectors of education and between science and technology and other subject areas, has become less pronounced.)

In numerical terms perhaps half of those 500 packages might be relevant to the teaching at Imperial College which is a school of the University of London specialising in Science and Technology. Now, good quality CBL materials, like all good learning materials, are expensive to develop and so this stock of packages was seen as a highly valuable resource which could be mined if the College set up a small unit to advise on their use.

Thus the CEDAR Project (Computers in Education As a Resource) was set up in the last few months of 1977 with the aim of encouraging and facilitating the development and effective use of educational computing both within *and* beyond Imperial College.

The Project supports teaching staff by providing an information service and demonstration facilities by developing and implementing educational computer programs and by assisting with educational development and training. Wherever appropriate, it endeavours to work with other organisations involved in CBL and so it has established and maintains contacts with other projects in the UK and Europe and overseas, exchanging information and expertise.

CEDAR has adopted a strategy which aims to encourage teachers to examine the possibilities afforded by the medium of CBL to recognise its contribution as a solution to some of these problems and then to participate in the development of appropriate educational solutions. The emphasis is firmly on the educational problem and its solution rather than on CBL as a solution in search of a problem. One tactic that has proved effective in this situation is to organise a demonstration for the teacher in which *he can play the role of one of his students* in working through learning material chosen to be appropriate in terms of its level and subject area. Then if the teacher wants to explore the use of CBL further the Project can help to implement suitable materials, either by developing them from scratch or more probably by importing existing materials developed elsewhere and modifying them to meet local needs. This latter approach has proved very cost effective – a most important consideration in these days of financial austerity.

However, the strategy adopted by the Project needs to be supported by a programme of educational and training development, and by information on the use of computer based learning.

Staff development in this area is currently organised on a piecemeal basis but a new project involving CEDAR and several other cooperating institutions is being set up to develop a course called 'Using Computer Based Learning' which is primarily intended for inservice training in higher and secondary education, and can also be used with student teachers and with training staff in industry and the armed services. The emphasis of this new course will be teaching with the aid of computers, rather than about computers themselves.

The CEDAR information Service on the Use of Computers in Education and Training, which was originally developed to serve the needs of the College was rapidly extended to provide a more general service for the *whole* educational and training community. It now provides a variety of information about the milieu of educational computing such as

- **general descriptions of computer assisted and computer managed learning**
- **descriptions of specific educational computing projects**
- **the implications of educational computing for curriculum design and assessment**
- **the technology associated with educational computing**

The enquiry service is founded on a database which holds details of books, reports and papers on CBL and related topics, and details of CBL packages available in the UK. This is shortly to be extended to include details of projects and individuals active in CBL in the UK. The database can be searched on line for specific enquiries and is also used to produce various catalogues both in print and microfiche form.

The Project also maintains an ever growing collection of publications relevant to CBL within the main college library, whence they are available on loan to members of the College and to other libraries.

Starting in 1978, the amount of information available through CEDAR grew substantially – and the number of enquiries from all sectors of education and training rose dramatically, so that by the end of 1979, the Project was in danger of being submerged under a deluge of requests. Fortunately, at this time the Council for Educational Technology agreed to provide funding for a full time information officer to operate and develop the service further. The Council's support has proved very timely. Over the past few months there has been another great leap in the number of enquiries, including an increasing number from commercial industrial and military training organisations. Further the recent announcement of the DES funding programme for Microelectronics in Schools and Colleges has already sparked off renewed interest in CBL. As microcomputers become more widely available the possibilities for using them in teaching grow and we may therefore expect micros to bring quantitative (but not yet qualitative) changes to CBL. The CEDAR Project is looking forward to a busy time in the 1980s.

Further information about CEDAR and the use of computers in education and training can be obtained from

Judith Morris
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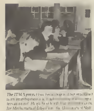
■

Nick Rushby has been working in the area of educational computing for eight years first at Brighton Polytechnic then as project coordinator for the UK National Development Programme in Computer Assisted Learning and now since 1978 as Director of the CEDAR Project at Imperial College London.

SCAN

A systematic classroom analysis notation



The ITMA project (see [illegible]) is an investigation [illegible] computers as an aid. Hugh Burkhardt [illegible] for Mathematical Education [illegible] the University of Nottingham. The ITMA [illegible] college of St Mark and St John [illegible] in this [illegible] introduction of the [illegible]

The series of [illegible] this month in a [illegible] Newsletter index [illegible] selected illustrates [illegible] observation in the classroom

ITMA Newsletter 2

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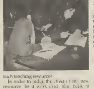
In the SCAN system Terry Beeby Rosemary Fraser and I are trying to develop a method for describing in detail the essentials of a mathematics lesson it concentrates on the dialogue but also relates it to other activities and resources used We are aware that these are ambitious aims but we believe that the system may be useful in the evaluation of new curriculum material including computer programs it also has applications in teacher training and other areas

In this work we are looking at the processes of teaching and learning *as a whole* not simply the computer based part The system of evaluation is to be built into the development of curriculum material rather than grafted on to it in order to provide detailed systematic feedback on each unit as used by a variety of teachers The ITMA project regards the computer as only one element in the teaching system – an aid to the teacher and not a replacement for him, indeed we believe that the compelling nature of a classroom micro computer may sometimes lead to its undesirable dominance undermining the teacher's effectiveness and perhaps also the computer's acceptability It is part of the evaluation to establish a proper balance between such teaching resources



In order to judge the effect of any new resource be it work card film book or computer program we need a detailed picture of the process of teaching and learning in lessons both without and with the resource

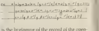
We have designed the SCAN system to provide this information initially in the context of mathematics teaching It provides a notation for describing a lesson as it takes place in terms of natural units of interaction on three different levels of time scale

- the remark
- the episode' and
- the activity

Remarks of various kinds (questions explanations etc) are qualified by descriptors indicating depth and level-of guidance Additional information on the teacher's strategy the content and the resources used is added together with copies of pupil's work. When a computer program is among the resources used a complementary analysis of the style of its design and use is essential we have identified a number of dimensions for this classification some relating to the program structure and content and others to the way in which the teacher chooses to use it

The aim of these observations is both to enable the creator of the program to construct better programs and the user to incorporate them into his teaching more effectively

Here I shall try simply to give a flavour of the SCAN notation a more extensive write up is in preparation For example



is the beginning of the record of the opening exposition (activity E) of a lesson based on printed material (resource PM – a text book described separately) It opens with a managerial remark (m) followed by a question (q) The qualifier α 3 describes the type of question on the following basis

Depth of demand on the pupil

- **α – recall of a single fact or act.**
- **β – an exercise, stringing together several steps**
- **γ – an extension of previous skill or understanding**

Level of guidance

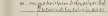
- **1 – highly structured or closely guided so that the pupil sees only a small number of choices**
- **2 – some guidance but connection rather than mere selection required**
- **3 – minimum guidance including open questions**

These two aspects are not completely separate – the range of guidance level possible for an α question is clearly different from that involved with γ questions a little practice is needed to get used to judging

the qualifiers particularly the guidance level

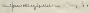
Returning to the example the response to the question was indicated by o and this ends the second remark (x = wrong o = no response, ✓ = right) The linguistic descriptors (d = definition x = example e = explanation i = instruction a = assertion etc) are straightforward and with the repeat sign ∧ and a note Ⓡ = resource when the text book is used take us through this episode We summarize this episode as a defining one /D/ it was then followed by one initiating /I/ another activity

Teacher-pupil dialogue D with pupils working alone, W1 often involves coaching /Co/ and facilitating /F/ episodes new types of remark also enter o = observation c = confirmation or k = correction and pupil questions pq An extract from a teacher-pupil dialogue with a different teacher looks like



At present we list about six activities fifteen episode summaries and fifteen remark types The classification of responses to questions covers pupil hypotheses h which are left open for some time repeated questions (numbered) and digressions (in parentheses) I conclude with an episode in which the same teacher as in the first example is using the JANE program.

Project



with the class in a successful search /SS/ for the function of say JOHN

Though SCAN has been developed using video tapes of teachers in the project team teaching with, and without the aid of a computer program (these are essential for a considered discussion) we have found it straightforward to use the system in real time in a live lesson

The system is itself still in the process of development and evaluation Impressions so far are informal However good inter-observer consistency is achieved with little training Record and readback by different observers on video lessons has produced a graphically realistic description of the teaching styles employed styles which are separately observed to be variously modified when the same teachers are teaching using the JANE program unit The records give specific information which tells us far more than an unstructured impression of the lesson by an experienced observer as well as providing quantitative information on the style of teaching it often gives a qualitatively different impression of the lesson We are now verifying more carefully these and other hopeful features of SCAN as well as developing it further

It is appropriate to finish with some preliminary remarks on what we have learnt about JANE from looking at the SCAN records, they are highly provisional because all concerned were trying out new techniques to which they are not fully acclimatized They are based on our analysis of video tapes of three teachers using JANE with secondary pupils

- 1 The program is highly flexible, as it was intended to be, the three teachers used the program in very different ways, reflecting their different natural styles but in each case the style differed in some aspects from their work without the computer
- 2 The mathematical demands on pupils at this level were fairly deep since the concept of mathematical function is not an easy one, but the response of the majority of pupils was encouraging SCAN shows a large number of γ level questions most of which are fairly quickly resolved with a high level of pupil participation
- 3 The program generates a large number of pupil hypotheses These are nearly all tested, some remaining open for extensive discussion the extent of this, and its variation between the teachers is clearly shown by SCAN
- 4 There is a high level of pupil activity – mostly in supplying hypotheses but also in some cases in supplying explanations The extent to which all pupils in the class are involved is not shown by SCAN (though we are developing the notation to include an estimate of this) but we are left with an impression that a higher than normal percentage of pupils were engaged in active participation

We are grateful to Jim Eggleston Colin Wells and Alan Bell for comments and suggestions and shall be happy to receive further comments and enquiries from those who may be interested ■

Footnote

Full copies of the SCAN paper can be obtained from the Shell Centre for Mathematics Education Nottingham University Nottingham

Newsletters can be obtained from the Project Secretary College of St Mark and St John Derriford Road Plymouth PL6 8BH – at the cost of £1

The ITMA Project has an interactive program running at the SCIENCE MUSEUM Challenge of the Chip Exhibition It illustrates some of the features of a microcomputer that a program designer can use but it is not an educational program To illustrate the use of a microcomputer in the classroom the team are giving a lecture in the Science Museum on 2nd June Tickets can be obtained from the Education Office Science Museum Exhibition Road London

Rosemary Fraser

WILL YOU HELP ASBAH TO BENEFIT FROM D-DAY 1980?

ASBAH (Association for Spina Bifida and Hydrocephalus) is appealing to companies in the computer industry to support their work by sponsoring one or more of the parachutists who will make a D Day landing of an unusual kind In June when a six man Services team plans to cross the Channel by parachute

Leaving a Piper Navajo aircraft at 25000ft above Dover Castle the team which will use oxygen equipment expect to land near Calais having covered the 22 miles in about 25 minutes

Using British made Unit Ram Air parachutes which when opened look something like a single bed mattress in flight the team plan to make their descent across the Channel shortly after first light when air traffic is at its lightest Even then it will be necessary for air traffic controllers to divert up to 50 aircraft to allow the team a one mile wide safety corridor Air Traffic clearance has been given for the attempt to take place any day after 1 June when weather conditions are suitable

The team will consist of three men from the Parachute Regiment two from the Royal Marines and one man from the Welsh Guards The exercise code named Exercise Courage 80 is sponsored by Courage the brewers

With the full support of Courage and the Services Benevolent Associations ASBAH is raising funds by asking companies to sponsor one or more parachutists for the sum of £3 per mile

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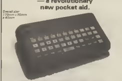

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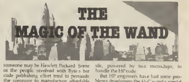


THE MAGIC OF THE WAND

During the late 1970s, attempts in the United States to publish software in a bar code form produced one of the industry's loudest thuds. But bar code publishing is an idea that refuses to die. Hewlett Packard believes that bar code-reading wands still have some magic in them. The company is selling an inexpensive wand, the HEDS-3000, which can be used with personal computers and has another, slightly different wand now in the works for its top - of - the - line 41-C calculator.

Although HP is a johnny-come-lately to the wand business, it is the first major vendor making a serious commitment to marketing the items. Yet there are people in the industry who have been watching bar code publishing for some time, and many of them are sceptical.

"If I thought there was a resurgence of interest in bar code programming," says Fred Merkowitz, "I'd be out there selling wands myself. But given what I've seen so far, I don't believe there's any market."

Merkowitz, with his partner Ken Budnick, manufactured and sold bar code wands during the late 1970s through his company MicroScan. He also wrote on the subject for Byte magazine, the American personal computer journal now owned by publishing giant McGraw-Hill.

In 1977, Carl Helmers, who founded Byte magazine in 1975, first asked Merkowitz to write an article on the then-new personal computer bar code designed by Walter Banks of the University of Waterloo, Ontario. After the first series of articles on the subject appeared in Byte, the magazine was flooded with requests for an affordable bar code scanner. Merkowitz teamed up with Budnick (who wrote bar code loader software) and formed MicroScan Company to try and meet this new demand for wands.

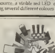
Problems cropped up almost as soon as the company started. At first, Helmers printed bar code software in Byte magazine. Later, he published books of bar coded programs, and stirred up a wave of interest in this software publishing technology. But the initial interest quickly ebbed, because there just weren't good, cheap readers available. Byte magazine began publishing fewer programs in bar code, while sales of its bar code "Paperbyte" books dropped off.

These days, MicroScan's Merkowitz works as a private consultant, the company is dormant. But the inventor still has hope. "We had a superior product," he says, referring to the company's wand reader. "But we couldn't make it in quantities large enough to be economical. I'd still like to license the design and have someone else make it, someone who could manufacture cheaply and in large quantities."

Unfortunately for Merkowitz, that someone may be Hewlett Packard. Some of the people involved with Byte's bar code publishing effort tried to persuade the company to manufacture affordable wands for use with the magazine's software. Now, just a few years later, HP is making its own wands, and will also publish its own bar code.

HP isn't giving out any numbers, but they apparently sell enough wands, or think they will sell enough, to keep the price down to about $100. If HP is to be believed, the HEDS-3000 wand is, in fact, selling very well. "The wand has already been very successful," says a HP manager, "and I think this is a market that is really opening up."

The HEDS-3000, available in the U.S. since last December, can be interfaced with any personal computer that is TTL compatible. These days, that includes most popular machines. In addition, the wand reads all common bar code formats that are printed with a nominal width of 0.012 inches (0.3 millimeters). It has as its light source, a visible red LED, capable of reading several different colours.



HP hopes to sell the wand in four different markets: point of sale users (such as supermarkets), portable data entry users (for example, warehouse inventory), industrial users and personal computer users.

HP will soon market a somewhat different wand for its 41-C calculator. The 41-C already employs technology used in computers (magnetic cards, a thermal printer and read only memory) and is becoming very popular. The 41-C wand, which HP hopes to have ready by July, will read only HP's bar code, which the company says is similar to Byte's old bar code. Where the HEDS 3000 has a RS232 interface module, the 41-C wand will have a decoding module, powered by two microchips, to handle the HP code.

But HP engineers have had some problems developing the 41-C wand's special functions, and its entry on the market has been delayed. According to Tycho Howle, 41-C product manager, there are still some bugs in the wand's circuitry. Howle says "The wand is now about 95 per cent functional," and predicts that first deliveries will be "no earlier than the first of July."

Some HP observers wonder why, in light of companies' failures with bar code technology, HP is bothering to market wands. For a few years, computer users have been told the advantages of using programs in bar code form. Bar code is more accurate than other software media, they have been told, as well as easier and faster than keying-in data.

But bar code has not even become a standard for commercial applications. The USC code seen on most American supermarket products, magazines and cigarette packs are used by only a small minority of retailers. This is largely due to the objections of U.S. consumer groups who claim that the use of bar codes in supermarkets eliminates the need for price tags on food packages. And this, they say, hurts the consumer.

Nonetheless, HP hopes to succeed with the wand. They just may do it, the company is known for having a set of fans who line up to buy whatever it sells.

HP now reports a 4-5 week backlog on production of the 41-C calculator, and some New York dealers complain that the company is not giving them enough of the popular calculator to keep up with the demand. One store recently sold 40 of the little machines in only three hours. Meanwhile, HP refuses to enlarge its production capacity, claiming that demand will eventually taper off.

But some dealers question the wand's viability. "Sure, the HP freaks will buy the wands," comments James Crimaldi, "but who else will?" Crimaldi is vice president of New York's Super Business Machines, a store that receives one of the largest allocations of HP equipment in the city.

In addition, some retailers of HP machines say many customers buy HP products as status symbols which they proudly display on their desks but rarely, if ever, use. While it is therefore possible that HP will sell a lot of wands, it is also possible that many of these will, in turn, end up as electronic closet stuffers. ■

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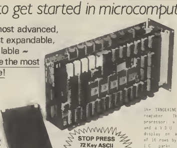

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BIT SLICE MICROPROCESSORS

[illegible] is to a usual architecture [illegible] that a hand crafted chair is [illegible]

Most readers will be familiar with microprocessors such as the 8080 the Z80 or the 6502 where the complete processor is constructed on a single silicon chip All the functional units required to process data and control the system as well as recognising and executing the program stored in memory are included within a single package (as in figure 1)

Microprocessors have been designed which handle data organised in units of four eight or sixteen bits (and doubtless processors will eventually become available which handle data in units of thirty two bits) but it is often the case that a particular application requires that the data is handled in units of some other length say ten twelve or twentyfour bits (or at the moment thirtytwo bits) It is possible to use a microprocessor which is designed to handle data in larger units than is required so long as one is available or to split the data into two or more smaller units but this is slow and often very inconvenient When using a mass produced microprocessor it is also necessary to accept the instruction set built in to it by its designer when the addition of a few suitable instructions would greatly ease the programmer s task

A different type of microprocessor has therefore been designed in which the different functional units are split among a number of different integrated circuit packages (see figure 2) This is called a 'bit-slice microprocessor since the arithmetic/logic unit (the only part of the microprocessor which actually handles data) is made up of a number of identical units connected in prallel to obtain a processor of the required word length These slices are usually only two or four bits wide and manufactured using bipolar technology rather than the slower metal oxide semiconductor technology used for most eight-bit microprocessors to maximise processor speed

Apart from the arithmetic/logic unit two other units are required to complete the processor These are the microprogram control unit and microprogram store It is impossible for the semiconductor manufacturer to design and build in a processor architecture and instruction set as the basic unit of computation the processor s word length is not constant Each instruction must therefore be programmed as a series of sub program stages called microcode This microcode is stored in the microcode store and is located and executed by the microprogram control unit as required by the program instructions being loaded from the main memory

The microprogram can be written in such a way that the processor executes the program instructions of *any* required processor or a *completely new* processor architecture designed round the particular application which the processor is to be used Normally the microcode is stored in Read Only Memory so that it is immediately available as soon as power to the computer is turned on

If the microcode memory is Read Write memory the microcodes are lost when power is turned off so the code must be 'bootstrapped into the processor from a suitable storage medium such as a floppy disc before processing can commence The advantage of this is that so long as suitable utilities are available the microcodes can be changed or added to by the user as required

It is also possible by adding other functional units around the basic processor just described to build up a series of computers using the same architecture and so able to run the same programs which form a family with increased processing speed or power as you go up the range For instance one option may be to include Floating Point arithmetic instructions within the instruction set rather than these having to be emulated in software This is likely to be an expensive option and will only be included on the more expensive machines of a particular range

A very flexible and powerful processor can be built out of bit slice components which with the addition of suitable microcode instructions can handle a wide variety of specialist applications for which it would be technically or economically impossible to design a suitable single chip microprocessor

The system designer has considerable flexibility in using microcodes to define his own instructions which will perform complicated operations which would require many instructions with a single chip microprocessor The microcoded instruction gives a considerable saving in execution time over an equivalent subroutine written in conventional machine-code, since it is unnecessary to decode each instruction before it can be executed. The problem is that if the action of an instruction is changed or a new instruction is added to the instruction set all the programs which you wish to run on your microcomputer system must be updated to work correctly

There is a considerable art in designing a complete instruction set from scratch and so this should not be attempted by anyone without a good practical knowledge of the operation of computers It is then necessary to design and write all the systems and applications, since the processor is completely your own and so the purchase of packaged programs is impossible

The use of bit slice microprocessors in packaged computer systems could be of interest to the hobbyist and professional user if a system is required which is to be programmed in a number of different incompatible languages each of which will support its own specialist operating system, say APL and PASCAL The

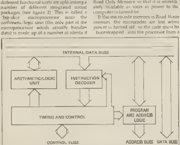

Fig 1 *Block diagram of a typical single chip processor*

microcode storage area [illegible] memory which must be [illegible] line storage such as a [illegible] the system can be used The [illegible] can then be supplied as part [illegible]

Architecture

future [illegible] both

instr[illegible]signed specially to suit the [illegible] application for which the microcomputer system is to be used This allows the instruction set to be optimised for its intended use so that programs should contain less machine code instructions and execute more rapidly than if the general purpose instruction of the conventional single-chip microprocessor was used

Because of the flexibility that they offer the systems designer bit-slice microprocessors will be of considerable importance for a long time to come The ability to define your own instruction set is particularly useful when designing complex dedicated systems and just as useful to the minicomputer manufacturer who already has a considerable investment in software to run on systems with their own processor architecture, and who wishes to enter the microprocessor field without the necessity of rewriting his compiler operating systems and other software

'Bit-slice microprocessors are manufactured by Advanced Micro Devices (the AMD 2900 series) and Intel (the 3000 series) I am grateful to the distributors (Cramer and Rapid Recall) for making technical information on both these series available for the writing of this article ■

Dr Martin Beer of the Computer Laboratory, University of Liverpool is an editorial adviser to Computer Age

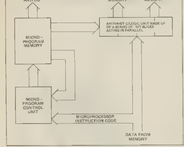
CONTROL TO MEMORY AND I/O
DATA TO MEMORY
ADDRESS TO MEMORY
MICRO-PROGRAM MEMORY
ARITHMETIC/LOGIC UNIT MADE UP OF A SERIES OF "BIT-SLICES" ACTING IN PARALLEL
MICRO-PROGRAM CONTROL UNIT
MICROPROCESSOR INSTRUCTION CODE
DATA FROM MEMORY

Fig 2 *Block diagram of the units of a "bit slice" processor Each block consists of one or more "chips"*

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Paul Martin

PUTTING IT TOGETHER

Previous articles in this series (Issues 4 to 6) dealt with introductory concepts approaches to getting useful work out of your computer and activities and interrupts

After looking at the main ways in which a micro system can be used for doing a number of things at the same time, we will look this month at how you should go about putting together a system

First, how many people are going to be involved in the writing of this system? One, two a dozen? Whatever size of team you choose, you are going to have problems! Some of the most reliable systems have been produced by single very experienced, software programmers but solo efforts do pose two major risks Unless you can monitor the standard of work while the project progresses, you may find out after many months expensive work, that the system won t work or more likely, that it won t work well enough for the load that it should handle On the other hand you may end up with a superb system but no documentation This means that you will not be able to make any changes to the system or worse still will not be able to fix any faults that may occur once your brilliant programmer has gone onto his next system For the type of programmer who can write this sort of system is not usually the type who would be content to wait around for the boring job of maintenance

So get this programmer to document everything But do get him to document it *before* he does it agreeing to document systems ' once it is all working is agreeing to having no documentation

With two people you are a bit better off as they can at least check each other s work If each of them has to use the other person s documentation then you have a chance of getting more of it.

When you have more than one person, someone has to be the boss One unfortunate result of this is that you have now created an administrator who will somehow manage to create paperwork that does nothing to further the project yet stops him from doing useful work on the system You end up getting little extra benefit for twice the cost

Large jobs usually produce large teams – although it is possible that large teams produce large jobs Having a large team introduces a new problem, communications By this I do not mean between Tasks or programs in a system, I mean between people who are supposed to be working together! On some large projects the management of people has absorbed more of the project effort than the programming

Do beware of the term man month misleading you You cannot just divide the number of man-months required to do the job by the number of people who will be working on it in order to produce an estimate of the elapsed time required – for there are some jobs that cannot be divided!

If the job is large enough to require more than three people then it is essential that the design of the system be formalised and the interactions between tasks in the system be documented *before* starting on the system One advantage of this setup is that, because you need to write down exactly what each person has to do you stand a chance of being able to document the work properly Of course in reality this does not happen! Why? Because it usually turns out that the job was underestimated and in the rush to meet a deadline, documentation is put off until after After the deadline has passed, another deadline appears and nothing gets written down

I may sound over-pessimistic but the system that you produce will be no good it It cannot be maintained. Would you buy a car no matter how fancy if you were told that the manufacturer had produced no workshop manual and that nobody knew how to service it?

Overall unless you have a really big system, the ideal size of team is probably two Whatever size you do decide on may I suggest that the part of the system that handles the sharing of resources between the application tasks on the system be left to just one person the most experienced one you can get hold of

Let us proceed to the system itself What jobs do you want it to perform? Are these jobs independent of each other, or are they just different aspects of the same overall job? How many terminals are going to be attached to the system? Is each of these terminals going to be dedicated to a different job or can any terminal be used for any job? If these terminals are general do you need some form of access control? This usually involves giving each job on the system a password that must be entered before the job can be used Do you want to keep a log of which jobs are run from which terminals?

What sort of loading has the system got to cope with? By this I mean how many transactions of each type will be entered on each terminal during an hour or a day? Will the rate of input remain constant, or will it vary at different times of the day, on different days of the week? How big are the peak loads? What is the maximum time you will accept between someone entering a transaction and their receiving a reply? Will it bother you if the response time deteriorates during peak load? How much can it deteriorate?

Now think about the data in the system Write down all the items of data required by each job List all the files that you will require Can a common database be formed? Do we need to protect any particular items of data from illegal access?

Shall we pause and look at some of these points in a bit more detail?

Security and confidence

You will see that I have mentioned the control of access to the system and the data on it This is because the loss of data or its acquisition by a competitor, can cost a company a lot of money This is especially true where a system is involved in the collection or spending of money, for then a subtle change to a value held in a disc file will be translated, by staff who trust the computer into a profit for someone A system that holds personal data on individuals should be protected from unauthorised use if you want to retain people's confidence

The first step towards providing this security is to place your terminals in positions where it is possible to see who is using them Don't, however, go to such extremes that it will be simple to see people's passwords as they are typed in. Terminals should also be restricted to using only those functions of the system that relate to the company department in which the terminal is physically located.

The next level of protection is to give each individual who uses the system a password, and to change it frequently. When a password is typed in the characters are not displayed on the terminal screen, and so no one should be able to steal them. If your system handles sensitive data then have the system keep a log of who uses which terminal and when. Keep also a log book with the terminal, and check this against the system's log. It is not unusual for people to leave the terminal without telling the system that they have finished, maybe they have just gone to take a phone call! At this moment the terminal is at its most vulnerable, so do include a check in the system that the terminal is being used. You could log off a user who did not type any characters within a set time period.

The system could also keep a list of which parts of the system available on this terminal each individual is allowed to use.

An even higher level of protection would be to assign passwords, or even a list of permitted users, to particular parts of files, with accesses being logged by the system. This is sometimes combined with a dual key protection. For a user to gain access to a very sensitive part of the data, he must enter the correct password and, at the same time, an authoriser must OK the action from a master terminal. Please remember that the programs that run on the system need just as much protection from modification as does the data!

'Coping with peak loads without introducing slight delays will cost a lot of money'

The rate at which transactions are entered into the system is a very important figure to find out. For, a system where each user takes two minutes to enter the details of a transaction and the computer takes only half a second to process a transaction can obviously support quite a few terminals. In the real world, though, transactions quite often arrive in the system at random rates. This is especially true where the terminal operators deal directly with members of the public. An order processing system may have a constant stream of transactions to process just after the post has been delivered and very few during late afternoon.

Coping with peak loads without introducing slight delays will cost a lot of money, spent on providing extra terminals and extra memory that will, for most of the time, be under utilised. So it is usually necessary to come to a compromise between cost and response when deciding on a system. Money spent on a survey to find out the kind of loads that your system will have to cope with is usually money well spent.

One of the prime reasons for companies installing real time or online systems is to give management access to up-to-date information about how the company is performing. Providing this information is obviously made simpler if the various items of data are kept together in one place. This need has led to the development of the Database, in which all the details relating to, say, a particular customer (details of orders placed, goods sent, bills sent, bills paid, etc) form one record. This record is referenced by all the programs on the system, sales recording, order processing, invoicing, etc.

Unless you can acquire a database package from a reputable company, anything other than a very simple database would probably play havoc with the reliability of the programs on your system. Lots of tasks all trying to grab control of the database for their own use will, at worst, cause the tasks to corrupt the data belonging to other tasks, and, at best, be a severe limiting factor on the capability of the system by providing a bottleneck through which all transactions have to pass. The deliberate creation of a bottleneck, by having only one task that handles the database, with all the other tasks sending request messages, is probably the safest way of implementing a database. Sophisticated access techniques can be added later when you need to increase the number of transactions handled.

What we have talked about so far, the jobs that the system has to carry out, should be described, along with loading figures and data descriptions, in the form of a document called the FUNCTIONAL SPECIFICATION. We then proceed to design a system to carry out the jobs in the functional "spec". The job of designing a system, and the customer's ability to decide if the design will fulfil his requirements before going ahead, is made easier if there is this formal statement of requirements to compare against.

The next document that we need to produce is the OUTLINE SYSTEM DESIGN. This should describe in general terms, what the parts of the system are, how they interact, and how they are to fulfil the requirements of the functional spec. The programmers will expand this into detailed task specifications before they write the code.

Programming language

One of the first choices that you have to make is the choice of programming language to use. Assembly language is difficult to test and not very easy to document sufficiently for other programmers to be able to understand it. Therefore, apart from the control routines, it is best for users involved in their first multi task system to avoid programming in assembly language. There is a shortage of High Level languages that can be used for this sort of system on micros at the present time, although this is bound to improve. What you have to look for is a language which supports subroutines or procedures that can be compiled separately and then linked together to form complete programs for running. It should also separate the data from the code; those compilers that are for producing code to load into read only memories (ROMs, PROMs) usually provide this facility.

The two main languages for you to choose from currently are PASCAL and FORTRAN. As I would recommend that you stick to structured languages for writing tasks, this choice should be between PASCAL and RATFOR (Rational FORTRAN), the structured form of FORTRAN. Rather than have me waste pages telling you about the advantages of structured languages, let me recommend that you read some of the many articles that have been written extolling the virtues of PASCAL's "structure". Programmers coming from a background of programming in BASIC will find adapting to FORTRAN far easier than PASCAL, so don't dismiss FORTRAN lightly.

Next you have to decide on the control mechanism that you should use to share out the system resources. A system that has only simple processing to carry out, yet has to cope with a very high rate of throughput, will probably find that the technique of swapping index registers described in the second of these articles (*Computer Age* Issue 5) is sufficient. A very complex system, such as for process control, will require to use semaphores with associated queues. But for most commercial systems the message-exchange will prove easiest to implement.

'Programs that run on the system need just as much protection from modification as doas the data!'

You now have to divide the system into tasks or activities. These should be logical units that can be written in sequential code, and that can run independently. The means by which these tasks communicate with each other, and with the outside world, should be specified. By this I mean the format of the message data passed between modules and the exchanges or semaphores to be used. The layout of data areas within memory has to be defined at this stage, as well as the layout of the records in the various disc files required.

The actual programming and testing of multi task systems requires a much more disciplined approach than normal programming. Each task has to be tested independently as if it were a section of a sequential single user program. When the tasks have all been throughly tested by themselves, the final system is built up one task at a time, with the system being rigorously tested after the addition of each new component.

No matter how many different combi

[illegible] you subject the [illegible] turns the monster [illegible] line one of the [illegible] set of circum[illegible] system This is [illegible] your documentation is real

At this point we enter the most controversial area of system design BACKUP and RECOVERY Recovery is about how the system is to recover from hardware or software crashes and backup is the keeping of sufficient information to enable the system to recover As simple as these two aspects of a system may sound they are the major cause of disagreements between people involved in the design of a system What you ask is the problem?

When you are running a normal single user sequential program a crash is annoying but not critical If the program has updated your files then it s OK if it hasn t then you can enter the transaction again But if there are lots of transactions in the system each at a different stage of processing, how on earth can you find out which file records have been updated and which haven t? To put it simply you can t! And if the crash was due to a software fault then you can t be sure that the system hasn t written garbage all over one of your files as it crashed

What you have to do is *to take regular copies* of your files, and then after crashing you can put the copy onto the system and re enter all the transactions that have been entered since the copy was made

Re-enter all the transactions that have been entered since the copy was made? This is where the subject of recovery enters the scene The aim of a recovery system is to log either all the transactions that flow through a system or else all the changes made to system files in order to be able to bring the backup copy of your files back to the state that they were before the crash (without one hopes causing it to crash again)

An alternative to keeping a log of all the transactions is to actually keep two copies of the files on the system and write all changes to both This will protect you from losing your data because of the failure of a disc drive providing that the copies are on separate discs It will not protect you completely from software errors and does introduce the problem of which copy if any did not get updated because of the crash

Yet another way is to have your main file as a master file that is not changed at all Instead the system will write the new copy of any record that is changed to a changes file At the end of the day this changes file is used to update the master file If each changes record contains details of where the last updating transaction came from then it should be possible to tell each user of the system what was their last successful transaction They have then only to re enter those transactions entered since the last successful one

The system should provide utilities that automatically save a complete copy of the memory and the computer s registers at the time of the crash This information can then be printed out for the programmers to use to locate the reason for the crash occurring

Let us go over the points to remember

- **1 Draw up a Functional Specification**
- **2. Test the System Design against the functional specification**
- **3 Decide on the control mechanism and language**
- **4 Document everything BEFORE you do it and AFTER**
- **5 Test each part of the system by itself first**
- **6 Build up the final system one part at a time**
- **7 Provide some means of protecting your data**
- **8 Take regular backup copies of the data**
- **9 Provide some safe method of recovery from crashes**

With that reminder of my main points I must finish this the fourth and last of my brief articles about the complex world of multi user computer systems I hope that while stressing the pitfalls I have shown that such systems are within the reach of most companies providing they keep things under control ■

- *Conclusion of the present series*

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BRAND NEWS compiled by Microspy with Anthony Esgate 7

This middle section may either be pulled out or photocopied then filed for reference It will be comprehensive and range over the whole field of products services events and courses **PU** stands for Personal User **SB** stands for small base – that is small budget or small business **MB** – medium base, medium budget or medium business **BB** – big base big budget or big business **Addresses** are to be found at the end of **Brand News.**

Systems

AGA COMPUTER MANAGEMENT LTD

AGA 171 microcomputer systems AGA 171/64 operates as word or data processor AGA 171 1R as satellite data processor Discette/disc drives printers plotters data entry devices available also software pack ages **SB**

APPLIED RESEARCH OF CAMBRIDGE

General Drafting System for Designers and Draughtsmen Features precision bit codes to draw points bearing a specific relation to an existing graphic elements and comprehensive set of automatic draughting constructions straight lines circular arcs polygons etc for unique flexibility and high speed Implemented on Prime and DEC equipment six configurations are currently available ranging from GDS 1 23 (0 5 Mbyte main memory 32 Mbyte disc capacity printing terminal 1 Graphics Workstation excluding tablet low speed A1 plotter and GDS starter system software with 7 days training) at £68 000 to GDS 5-59 (1 Mbyte main memory 96 Mbyte disc capacity printing terminal 5 Graphics Workstations with 2 A1 tablets high speed A1 plotter GDS high power drafting software with 10 days training) at £173 000

ATS

(Automation and Technical Services Ltd)

Telex Linked Word Processing System based on Vitel II telegraph compatible VDU Utilizing Vitel s editing and simultaneous 5 unit telegraph/8 unit ASCII code operation capabilities and a ¼ million character floppy disc drive system costs from £4 000 **SB MB**

New Telex [illegible]

GDS Drafting System

Burroughs

6900 Series of medium to large systems in 900 family Incorporates new CPU and integrated I/O and data communications subsystem expandable to 64 I/O channels each controlled by own Data Link Processor (DLP) DLP s which are programmable execute I/O commands independently of CPU Data communications functions also offloaded from CPU to Network Support Processors (NSP) and Line Support Processors (LSP) Main memory expandable to 6 2 million bytes integrated in CPU Up to 4 B6900s can be configured together to operate in multi processor shared resources or independent modes offering up to 22 million bytes directly addressable memory Object code compatibility through from B6700 B6400 to B6900 B7700 B7800 Hardware and software managed by Master Control Program (MCP) – system software includes Network Definition Language (NDL) Generalized Message Control System (GEMCOS) and a high level compiler (COBOL, ALGOL, FORTRAN PL/1 BASIC available) Two B6900 models available in UK B6920 (CPU 2 2 million bytes main memory maintenance processor LSP with 4 data communications lines operator console and I/O subsystem with 5 DLPs – £250 000) and B6930 (CPU 3 1 million bytes main memory maintenance processor NSP LSP with 8 data communications lines operator console and I/O subsystem with 5 DLPs – £300 000) Maintenance processor enables diagnostic software to be system driven and run concurrently with user program **BB**

COMPUTER AUTOMATION

Support products for SCOUT Naked Mini 4/04 16 bit minicomputer in industrial automation data acquisition process control (i) Floppy dual drive subsystem and controller IBM 3740 compatible with 256 Kbytes per discette (ii) 32 bit Bi Directional Digital I/O Interface 32 bits can be divided into 8 bit groups which are input/output under programmed control (iii) 4 Channel Digital to Analogue Convertor Output voltage ranges per channel 2 5V 5V 10V 0 to 5V 0 to 10V Conversion time per channel 20 micro seconds (iv) Battery Back up Board/Watchdog Timer supports up to 128 Kbytes of RAM and switches in d a c supply drops **OEM's MB**

DATA GENERAL

NOVA and MICRO NOVA packaged systems based on Winchester technology disc drives Examples 9065 B (micro NOVA MP/100 with 64 Kb RAM and 6101 12 5 Mb disc with integral 1 26 Mb discette – £6 586) 9066 C (micro NOVA MP/200 with 64 Kb RAM and 6104 25 Mb disc with integral 1 26 Mb discette – £9 083) 966 E (NOVA 4/C with 64 Kb RAM and real time clock 6097 dual 1 26 Mb per drive discette – £6 194) **OEM's**

IBM

(General Systems Division) *5120 Computer System* CPU main store 16 384 to 65 536 characters 2 built up discette files store up to 2 4 million characters keyboard 9 inch dis play screen printer API[illegible] 2 4 million character diskette and [illegible] capacity to 4 8 million characters Available software packages include General Ledger Accounts Receivable Billing Inventory Reporting Prices from £5 577 deliveries from March **SB, MB**

ICL

New *ME29* range of multi purpose medium power computers features two models *ME29 model 35* and *ME29 model 45* Both models have microprogrammed processor capable of operation at over 3 million instructions/second and data transfer rates of 4 Mb Main store 256Kb (384 Kb min model 45) to 1 Mb disc store 35 Mb to 16000 Mb One or two flexidrives incorporated in CPU cabinet also reads ¼ Mb discettes Available peripherals include Type 3551 magnetic tape transports 360 720 or 1130 l p m Train printer 180 c p s MATRIX printer 300 or 1000 c p s paper tape readers 110 c p s paper tape punch 600 c p m card reader Up to 3 asynchronous or synchronous Multiple Line Communication Couplers (A/S MLCC) can be connected to provide connection for up to 8 local devices local or remote communication lines A special Viewdata coupler linking 8 telephone lines to one SMLCC port will allow max 192 Viewdata T V sets to be linked to ME29 on completion of Thornlel software Transaction Machine Environment (TME) operating system utilising new text addressing mode will control over 200 VDUs run over 50 user programs handle data from 12 direct entry workstations perform I/O spooling for local or remote equipment or allow ME29 to operate as a satellite or as part of a distributed processing network Available software includes COBOL FORTRAN RPG II BASIC ALGOL and applications software eg manufacturing control accounting payroll order processing financial modelling FERT etc System cost starts at £35 000 **MB BB**

INTERSCAN COMMUNICATION SYSTEMS LTD

New communicating word processor *WORDCOM 10* with single station VDU twin floppy disc drives 540 w p m Diablo DAISYWHEEL printer Intel 8085 based WORDCOM 10 costs £6 950 **SB MB**

PLANNING RESEARCH CORP INTERNATIONAL (PRCI)

Following agreement with Prime Computers Inc will be sole UK dealer from Prime Information (I) series Initially available will be I 500 (256K to 1Mb memory 1 4 discs printer up to 16 terminals from £30 000) I 1000 (512K to 8 Mb memory 1 8 discs various peripherals up to 32 terminals from £55 000) and I 5000 (1 Mb to 8 Mb memory 2-8 discs various peripherals up to 64 terminals from £96 000) Prime Information Software provides simplified user interface with English like INFORM business language Additionally PRC offer business packages developed by Price Waterhouse (general ledger payroll purchase and sales ledgers fixed assets and general accounting) and their own packages (eg TRIPS see Applications) **BB**

PLANTIME LTD

Plantime Four intelligent time recording terminals using Intel 8085 chip to replace factory clock cards Terminals communicate (9600 baud on 20 mA current loops) with processor and each other via repeater units which have battery back up for 12 hr operations/72 hr memory life in event of power loss Employees use plastic key to clock in out and display personal data **MB BB**

BRAND NEWs

ICL s new ME29 computer

Keying [illegible] term

Q1 EUROPE LTD

Formed as a joint [illegible] by N E B and Q1 Corp (U[illegible]) Q1 *Microlite Computer* in UK Primarily intended for OEM it features Z80 CPU 3 [illegible] RM11 Operating System in 8k ROM) flexible disc drive (400 Kb per diskette) 12 x 40 character plasma display up to 4800 b p [illegible] synchronous 1200 b p s asynchronous communications capability Optional extras 15 [illegible] DAISYWHEEL printer 200 Mb [illegible] disk drive 800 or 1600 b p i [illegible] Tape drives 300 or 600 l p m line printer multiple or to link Microlites to [illegible] database software PL/1 and COBOL ANSI 74 dual level 1) compilers [illegible] **OEMs**

RAIR

Black Box II microcomputer based on Intel 8085A microprocessor Max 64 Kb RAM dual mini disc drives transparent ROM bootstrap for system load from floppy disc program mable serial I/O interfaces supporting synchronous/asynchronous operation at up to 19200 baud Multi user operating system support for up to 16 simultaneous users Extended BASIC interpreter and compiler relocating FORTRAN IV compiler with link loader for subroutine libraries and assembly language routines ANS 74 COBOL compiler Sort/Merge File Management Data Communications Packages (see also Discs) **MB**

The Q1 Microlite Multifunction Desk Top Computer

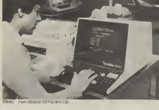
Applications

ABACUS COMPUTERS LTD

Accounting System *VWAS* for Abacus 60K desk top computer (integral memory mapped VDU 2 x 1 MB Shugart floppy disk drives or 10 MB Winchester with tape back-up – from about £10 000) includes Sales or Purchase Ledger format which can be integrated with Nominal Ledger On line reporting generates daily weekly or monthly statements/summaries Written in CIS COBOL system can be used by all levels of staff Disc based software from £2 500 **SB MB**

ACT

APPLEWARE range of software for APPLE II *from major American suppliers and others included are Talking Disc™ APPLE Data base and VisiCalc packages* **PU, SB**



VWAS from Abacus Computers Ltd

ALMARC DATA SYSTEMS LTD

Software supplied as standard on Vector Graphic System B (now expandable to 5 terminals) includes MDOS and CP/M2 operating systems Microsoft BASIC 80 Interpreter and software aids SCOPE (Screen Orientated Program Editor) and RAID (Rapid Interactive De-Bugger) SCOPE replaces CP/M text editor ED whilst RAID is for assembly language software development **SB, MB**

A. J HARDING (MOLIMERX)

Distributors of RACET Computers Software in UK announce sorting program for Tandy TRS 80 Model I and II designated DSM Sorts an 85K diskette in less than three minutes **SB**

COMPUTERPLAN

Sales Ledger Package written in Data General CS COBOL Can interface with Computerplan's General Ledger Package Produces customer statement advice aged debtor list, VAT report summary or detailed sales analysis report and selective customer lists **MB**

COMPUTERPLAN LTD

Solicitor's Package to run on Data General Computers Provides Client Accounting Time Recording Nominal Accounting Allows for multiple branches within a practice division of a practice into specialising departments and division by partner and matter type **Solicitors**

DATA GENERAL

Database Management System – *DG/DBMS* – for commercial ECLIPSE computers Operates under AOS manages 4.4 billion characters contained in up to 16 disc subsystems for access or retrieval Interfaces with COBOL handles information with a "network" data structure Sequential random multi-key indexed sequential access techniques available as well as true database access strategies Maintains logical organisation of data and invoices logs transactions and performs back up/recovery controls security makes programs independent of data record layouts compresses data for storage controls concurrent updates helps centralize data DG/DBMS consists of two run time monitors and four utilities (see diagram) A fifth utility DG/DBMS IQ Interactive Query (optional) allows authorized clerical and other personnel to make logical retrievals from the database using English like command language Licence for DG/DBMS (inc installation 1 year Software Subscription Service and training) – £6 194 Subsequent license fee £4 238 Licence for DG/DBMS IQ as above but without training £1 630 Subsequently £978 In addition Data General announce *INFOS II* file management software offering AOS and RDOS users multi level key capabilities and support for hierarchical data structures

DATA GENERAL

Announce multi tasking *MP/OS* operating system on NOVA 4/C and 4 S minicomputers Also enhancements to MP/PASCAL language supported by MP/OS on microNOVA and NOVA 4 as well as HOS on ECLIPSE mini computers MP/PASCAL features multi tasking separate compilation dynamic length string types interface to assembly language routines random file I/O facilities I/O and data conversion procedures nested procedures dispose and freespace procedures MP/OS which is compatible with AOS features such utilities as command line interpreter macro assembler relocating link loader text and library editors and source code comparator **MB BB**

DIGICO LTD

Easy Suite Report Generator/Screen Handler for M16 and M28 series available from Harrington Software Enables users to define screen layouts and characteristics of data input using them define simple or complex report layouts produce documentation automatically Reduces dramatically effort and cost of producing tailor made application software **SB MB**

ENCOTEL SYSTEMS LTD

MDBS CODASYL Orientated Database Management System for Z80 CP/M microcomputers £450 **PU SB**

GSI (UK) LTD

Dealer Systems Group introduces PDP-11 based system for Motor Dealers GS Software includes Stock Management System (automatic ordering/price updates P O S invoicing stock valuation parts order control) Management Accounting System (Sales Purchase Nominal Vehicle and Warranty Ledgers Generation of customer statements debtor analysis remittance advices inventory control) Basic Level One System (64K VDU printer 20 MB disc) – from £15 950 Level Two (256K 6 VDUs 5 printers) – up to £57 000 **MB BB**

HEWLETT PACKARD

Materials Management/3000 package Improves upon HP MFG/3000 Can be changed by user without compromising support Menu-driven system can be installed and tailored without need for programming languages On line and database oriented package interacts with users through crt terminals Package handles master production scheduling rough cut resource planning bills of materials routings and work centre materials issues and receipts £15 000 right to copy for additional HP 3000 £3 000 customer support £192 per month Delivery 16 weeks **MB BB**

HOSKYNS

PAYROLL Package addition to MAS M for Hoskyns Business System (DEC PDP 11 based using TS 500 RSTS E BASIC + 2 and RMS11K Available stand alone or part of total package Features on-line PAYROLL records via MAS M Transaction Processing Monitor gross pay calculation and production of Giros and cheques tax year end processing on line enquiries capacity to run 99 payrolls independently **MB BB**

LIVERPORT LTD

Two new versions of Research Machines *ALGOL 60* for Exidy Sorcerer New versions use 32 bit integers and can perform low definition teletext type graphics using Sorcerer's display £99 either version **PU SB**

MICROSENSE

APPLE Writer Word Processing Package Edits and prints text Automatic search with replacements option text justification upper/lower case type Package consists of two master APPLE Writer diskettes and operating manual £42 Requirements 48K APPLE Computer disc drive and DOT MATRIX or impact type printer **PU, SB**

NASCOM

Text Editor *NASPEN* for Nascom 1 and 2 microcomputers Two versions V5 1 for NAS Sys monitors and VT 1 for Nasbug T4 – not suitable for Nasbug T2 and B Bug Intended for use with 16K RAM though 8K can be used Two modes – Command/Edit and Append/Insert 44 commands Supplied in 2 2708 EPROMs both versions £50 **PU**

NETWORK DATA (PROPERTY SERVICES) LTD

In conjunction with the Royal Institute of Chartered Surveyors are to promote Prestel Channel 2244 as RICS EG network Users will obtain updated information on currently available property by keying into the channel **MB, BB**

PLANNING RESEARCH CORP (PRC)

TRIPS (Transportation Improvements Programming System) package available on Prime systems Written in FORTRAN TRIPS features survey analysis model building network analysis and system evaluation **MB BB**

TEXAS INSTRUMENTS

DXS Interactive Software package available as addition to DX10 system software consists of DXS Operating System and DXS packages for COBOL Run Time Sort-Merge and 3780/2780 Emulator Communications This facilitates COBOL developments on DS990 Models 4 6 8 20 or 30 with DX10 COBOL Code is then linked with DXS COBOL Run-Time package and disc/discette copy produced for DS990 Model 1 or 2 (configured with 64 Kbyte memory and two discette drives) TI has also purchased MICRO FOCUS portable CIS COBOL to run under the UCSD Pascal Operating System on TI s 16 bit 9900 microprocessor The complete Pascal environment can be run as a 64K task under DX10 In addition TI have announced a *Burroughs Poll/Select Emulator (BPIS)* for Series 700 Models 770 771 and DS990 Model 1 to allow communication (switched) leased lines ASCII character set, synchronous/asynchronous at 9600 baud) in Burroughs networks

WESTINGHOUSE

New release of *FLEE/FLIM* (Fast Linkage Editor Fast Library Maintenance) for IBM DOS/VS(E) users Version contains new program FLIC (Fast Library Copy) to replace IBM s CORGZ FLIC is faster than CORGZ by a factor of 1 5 to 13 and has extra integrity checks and security features FLEE/FLIM/FLIC is now a complete replacement for IBM DOS/VS Librarian £90 per month or £2 200 purchase **MB BB**

Discs, Tapes, Punches, Readers

GENERAL COMPUTER SYSTEMS (UK) LTD

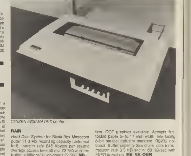
Marketing Telex Computer Products Inc s *Model 6250* 19 rack mounted tape transport with associated *Model 6850* formatter which can handle 4 or 8 drives Drives can store 800/1600/6250 bits per inch (standard ANSI recording data format) at tape speeds of 45/75/100/125 inches per second Rewind speed 500 inches/second Employs primary and secondary vacuum buffers fixed air bearings and low inertia capstan mechanism (capstan weight 1 9 gm) Double and triple density versions available (Models 6250 and 6253 respectively) **OEMs**

Telex Model 6250 Tape Drive

BRAND NEWs

HAL COMPUTERS LTD

SENTINEL CTR 80/86 Intel Multibus Compatible Controller enables users to add both Winchester disc drives and up to 4 double density floppy disc drives CTR-80 86 consists of 2 boards first designated B001 using 8085 microprocessor with ROM and RAM controls floppy disc drives as well as second B004 board which is high speed data channel for Shugart SA4000 15 or 30 Mbyte fixed Winchester drives Up to 4 such drives can be accommodated giving potential 120 Mbytes Potential for floppy disc drives is 2 Mbytes Operates in interrupt or non interrupt modes communicates with SBC processor via 32 byte control blocks maintains a drive table of 32 bytes per drive in memory £4 000 with Winchester drive **MB**



CITIZEN 5700 MATRIX printer

RAIR

Hard Disc System for Black Box Microcomputer 11 3 Mb recording capacity (unformatted) transfer rate 648 Kbytes per second average access time 50 ms £2 750 with controller additional add-on drives £2 500 **MB**

RAPID RECALL

RX02 Floppy Disc Drive developed by DEC for LSI 11 and PDP 11 families can be operated as single or double density dual drive unit Comprises two disc drives read/write electronics module microprocessor based controller module and power supply in rack mountable self cooled chassis 512 Kbytes per disc average access time 263 ms In addition Rapid Recall *iSBC 204 Universal Floppy Disc Controller* developed by Intel and compatible with most single density soft sectored standard and mini floppy disc drives Can control 2 drive surfaces (4 with addition of second Intel 8271 integrated circuit)

SYSTEM INDUSTRIES (EUROPE)

New Tape System for direct interface to DEC 11/70 cache bus Based on Storage Technology Corp s 1900 series of Tape Transports new unit operates at 6250 b p i dual density and utilises cache interface (RH70 emulation) as used on 9400 range of disc storage systems Runs without interfering with other high-speed DMA peripherals Compatible with DEC TU45 software Presented in free standing cabinet with formatter Cache interface connects directly with 11/70 RH70 slots Transport speed 75 i p s with 1600/6250 b p i transfer rate 120 Kb at 1600 b p i 470 Kb at 6250 b p i About £18 000 **OEM, BB**

Printers

DRG BUSINESS MACHINES LTD

Have been appointed sole UK distributor for Japanese *CITIZEN* printers Initially available will be *Model 5700* 120 c p s and *Model 5800* 180 c p s impact MATRIX printers 136 columns 10 character/inch with software-selectable condensed or expanded print 9 x 9 MATRIX printing head 96 ASC11 characters DOT graphics available Accepts fan folded paper 5- to 17 inch width Interfacing 8-bit parallel industry standard RS232 optional Buffer capacity 256 chars data transmission rate 3 5 KB sec or 80 KB/sec with FI/FO operation **MB BB OEM**

ENCOTEL

ESL Series 80 MATRIX impact printer 72 80 96 132 characters per line elongated characters 96 character ASC11 and full APL character sets user defined characters and graphics auto form feed/line feed horizontal tabs vertical tabs and variable line spacing Software features resettable Prints bidirectionally at 80 c p s takes paper up to 9 inches wide and has tractor or friction feed RS232 CENTRONICS IEE 488 and 20 mA interfaces standard Options 2K terminal buffer and foreign language character sets £375 **PU, SB**

RAIR

Model 730 miniprinter Handles cut sheets computer fan fold paper roll paper 100 c p s 8 inch wide paper 80 or 132 columns 7 x 7 DOT MATRIX print head full ASC11 character set foreign characters £555 **SB**

ROXBOROUGH ELECTRONICS LTD

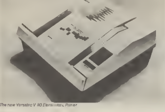
Series 3000 miniature alphanumeric printer Free-standing non impact SF-30 electro sc[illegible] character [illegible] lines [illegible] parallel character serial ASCII [illegible] levels with strobe signal [illegible] request data change. Also input character learning and print initiate. Also 40 character impact needle printer *SP402* (100 c.p.s.) and *TP 18* papertape punch compact and very competitively priced **PU, SB, MB**

VERSATEC

V80 Electrostatic Printer Plotter 1000 132 column l.p.m. 11 x 8½ inch plot with 200 dots/inch resolution 16 x 16 DOT MATRIX characters. Optional controller produces hard copy from display in 20 secs. Nickel writing electrodes. Microprocessor control. Prints in 8 languages. Meets UL and VDE standards. Interfaces with most popular computers. Versaplot software (FORTRAN callable subroutines) £4 750 **BB, OEM**

BRAND NEWs

Roxborough Series 3000 printer



The new Versatec V 80 Electrostatic Printer

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COSTRONICS ELECTRONICS

Microspeech 2 voice output unit converts phonetic code or text (input via 125232 connection) into speech output. £875 phonetic model. £950 English to phonetics model **PU, Labs**

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Microspeech 2 [illegible]

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02 — *ENTER/PRINT INVOICES
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05 — *ENTER A/C PAYABLES
06 — *ENTER UPDATE INVENTORY
07 ENTER UPDATE ORDERS
08 *ENTER UPDATE BANKS
09 — *EXAMINE REPORT SALES LEDGER
10 — *EXAMINE REPORT PURCHASE LEDGER
11 — *MONITOR INCOMPLETE RECORDS
12 *EXAMINE PRODUCT SALES

SELECT FUNCTION BY NUMBER
13 *PRINT CUSTOMERS STATEMENTS
14 — *PRINT SUPPLIER STATEMENTS
15 *PRINT AGENT STATEMENTS
16 *PRINT TAX STATEMENTS
17 GENERAL HELP
18 ALTER VOCABULARIES
19 — PRINT YEAR AUDIT
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22 PRINT CASHFLOW FORECAST
23 ENTER PAYROLL NO RELEASE
24 — EXIT SYSTEM

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▶▶ FILE CREATE/DELETE/SEARCH ▶▶ RECORD CREATE DELETE [illegible] ▶▶ [illegible] SORT ANY FIELD ALPHA OR NUMERIC ▶▶ INDEX SEARCH OR GENERAL SCAN/PRINT [illegible] ▶▶ [illegible] FUNCTIONS TO USE AS CALCULATOR ON LAST FIELDS ▶▶ AUTO CHECK TO PREVENT DOUBLE ENTRY [illegible] MANAGEMENT SYSTEM DYNAMICALLY ALLOCATING INFORMATION TO MINIMISE DISK [illegible]

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[illegible]

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[illegible]	[illegible]

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CPM Postmaster	£ 75 00
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[illegible]	£ 19[illegible]

VARIOUS ● VARIOUS ● VARIOUS ●

We specialise in the new Superbrain double Density Twin Disk and Quad Density 800K Twin Disk complete micro computers with the fullest hardware and software support. All you need with this superb system (housed in one fine module) is any RS232 printer. It is possible to expand the storage capacity of the larger 800K with up to 11 meg hard disk. As well as linking 32 Superbrains together with a multi user base this undoubtedly is one of the best systems on the market at this time. Why not call Tony Winter and ask for more informatio[illegible]

NEW SYSTEM ● NEW SYSTEM ●

New System 3.3 Z80B 48K/64K + 2 4 Meg 8 Disk like Superbrain £4250 [illegible]
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INTERFACE

The Software Solution

We all know that a computer system is only as good as the software and that much of the applications software hitherto available has proved to be the weak link. Written in Microsoft basic for use with CP/M based hardware. Interface system is probably the most comprehensive and robust application software currently available, which really will transform your microcomputer into an effective problem solving tool

Applications Software
- Nominal Ledger
- Sales Ledger
- Purchase Ledger
- Payroll
- Incomplete Records
- Word Processing (Wordstar)
- Mailing Address

Etc

Systems Software
- CP/M
- MP/M
- MBasic 5 0 (CP/M) Interpreter/Compiler
- CBasic (II) Interpreter/Compiler
- Fortran 80 Compiler
- Cobol 80 Interpreter/Compiler
- Pascal 8 (UCDS) Interpreter
- Z80 Macro Assembler

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BRAND NEWs

ASCII [illegible] DOT MATRIX format. Internal buffer [illegible] Interfaces include RS[illegible] and 20 mA current loop full or half duplex. Asynchronous transmission at speeds of 110 to 2400 baud available. Parity and stop bits switch selectable **SB MB BB**

RAPID RECALL

VTG103 Video Terminal designed by DEC for LSI 11 based microcomputer system. Comprises CRT monitor, detachable keypad, LSI 11 backplane providing slots for 8 plug in mini cassette tape system built into terminal, 132 column 24 line display, 7 x 9 DOT MATRIX characters, double intensity, normal and reverse video, blinking, underlining and variable tabulation **MB**

TEKTRONIX

Model 606B high resolution X/Y cathode ray tube monitor. Uniform spot size 0 079 cm, light output variation less than 10%, display linearity 1% along major axes, 5-inch CRT P31 phosphor, 100V or 240V a c operation **MB**

The [illegible] 606B [illegible] monitor

PERSONAL COMPUTERS LTD

APPLE Graphics Tablet Package incorporates interface board that slots into computer. Tablet's pad has X and Y wire grid matrix embedded in smooth surface, device being driven by twin SRCs. Complete with electronic pen, pad scans in regular search pattern which is interrupted when pen is within 3/16 inch above surface. Pen incorporates pick up sense coil which detects high frequency field and picks up signal which is amplified, time-gated and fed into system. Basic input to CPU comprises double byte values of X and Y. I O board includes documented 2K ROM designed to express XYZ information in 5 or 7 byte machine language or BASIC providing programmer flexibility. Pen is spring loaded with pressure sensitive switch providing user with 4 different outputs – pen up to-down/down/down to up/up – encoding of pen down switch offers schematic to show test points. Matrix has 10 lines per inch within magnetic field offering resolution of 1/200th inch. Top speed crystal clock measures magnetic scan giving firmware resolution of one byte per inch on plastic surface. Package includes 12K of disc software written in Applesoft. Incorporates variety of graphical features with 22 element menu and peripheral controls for disc operation. Also 22 user definable codes blocks. Unit has potential as an input device as well as graphics £462 **PU SB**

R-SQUARED LTD

High Resolution Graphics Board S100 BUS compatible for any S100 BUS microcomputer system [illegible] 7 modes [illegible] digital output of [illegible] level grey scale. In digital mode resolution is 256 (horizontal) by 240 (vertical) screen elements displayed. Composite video output conforms to RS 170 levels and interfaces to most Raster Scan Monitors. Board is intended to be used with Vector Graphics high speed 8K RAM memory board (R Squared are Vector Graphics Suppliers) as refresh memory multiplexed between BUS and board. Included with board are alphanumeric character generator program, X Y axis plotting program, macro orientated pattern drawing program and several pre digitized grey scale images **PU, SB**

Tektronix 7854 [illegible] oscilloscope combined with the [illegible] graphics computer to form the [illegible] system

TEKTRONIX

Model 7854 microprocessor based oscilloscope. Combines analogue features of oscilloscope with digital storage and signal processing facilities. Fully programmable 7854 can be combined with a Tektronix desktop graphics computer to form complete signal processing system. Band width of d c to 400 MHz at 10 mV per division, calibrated sweep rate up to 500 ps per division. Digital storage of repetitive waveforms at up to 400 MHz, single shot events stored at up to 50 micro seconds division. Plug in unit allows pre trigger information from 0 to 100% of sweep to be displayed, optional memory allows 40 separate waveforms to be digitised and stored. Digital storing allows signal averaging to be carried out to recover signals from noise and improve measurement quality. Max vertical and horizontal resolution of stored data is 0 01 of a division with choice of 128, 256, 512 or 1024 horizontal points per waveform. 7854 is pre-programmed for most normal waveform measurements **Engineers Labs**

Processor & Memory Boards, Chips, Programmers, Test Instruments, Modulss, Training Aids.

COMPUTER AUTOMATION

NM4 95 top of the range high performance 8 register 16-bit *Naked Mini*. Upward compatible with all other NM4 systems. Includes Memory Management Unit (MMU) with address translation capability allowing memory addressing to expand to 8 Mbytes. MMU also provides page access protection and recording for each 2 Kbyte page of memory. Integral 2 Kbyte cache on MMU board with 50 ns access time and 85% hit rate provides effective 150 ns access time when used with new Error Checking and Correction (ECC) 580ns RAM memory (128 Kbyte and 256 Kbyte ECC RAM includes 8 byte micro cache which in conjunction with 2 Kbyte cache increases hit rate by 5%). 5 bit modified Hamming code allows correction of single bit errors and detection of 40% of double bit errors (correction is performed during refresh cycles). 9 slot split chassis holds up to 1 million bytes ECC RAM memory (upper 4 slots as in present NM4, lower 4 have 22 address lines allowing extended addressing of physical memory, centre slot split and occupied by MMU which performs translation of 16 bit addresses generated by CPU and DMA devices into 22 bit addresses for extended addressing. Existing NM4 I/O controller and peripherals are fully compatible. NM4/95 processor offers extension to NM4/90 instruction set. Floating point arithmetic is standard. No change either to compilers or utilities but assembler will be modified to include new instructions **OEMs**

CONTINENTAL SPECIALITIES CORP

CSC *Model 5001 Universal Counter Timer* offers time and frequency measurement plus signal conditioning facilities. Operates at up to 10 MHz as frequency counter. Also provides period and multiple period averaging fre quency ratio measurement, unit or event counting Two D C coupled BNC inputs of 1 MOhm plus 20 pF impedance with sensitivity 20 mV r m s each having 3 position attenuator (x1 x10 x100) positive/negative going slope selector and variable trigger level control Max frequency at A input 10 MHz B input 2 MHz 8 digit 7 segment filtered L E D display with variable delay control As frequency counter four gate times (0 01 to 10 sec) give selectable resolution of 100 Hz 10 Hz 1 Hz 0 1 Hz In period measurement mode time between successive rising edges at A input is measured over range of 1 10 100 or 1000 cycles and average displayed with resolutions 100 10 1 ns or 100 ps respectively Front panel indicators for overflow and gate open conditions £185 **Labs**

PORTABLE MICROSYSTEMS LTD

AIMEM add on memory system for use with Rockwell AIM 65 microcomputer or other systems using Motorola Exorciser bus and its derivatives Uses industry standard dynamic MOS RAMs is self-contained and has own power supply unit 32 Kbyte memory cycle time 500 ns read or write access time 300 ns £335 + VAT **PU, SR**

RAPID RECALL

Various new products

(i) *ICE 49 Module* to provide in circuit emulation for systems employing Intel 8048 or 8049 microcomputers (monitors in real time what is happening in system and stores information for analysis) Comprises 2 circuit boards within an Intellec microcomputer development system which connects with user system via supplied buffer module and cable with 40-pin connector which plugs into socket on user system designed for MCS 48 device Using ICE-49 software can be executed continuously or in single step mode Break points available Also ICE-49 can be used to examine and alter MCS-48 registers memory and flag values and examine pin and port values in a real-time environment

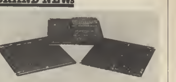
(ii) *2147 4K NMOS Static RAM* developed by Intersil Max access time 70 nanoseconds (50 ns 2147 3 model) Offered in 18 pin Cer dip package

(iii) *8041A/8741A Universal Peripheral Interfaces (UPI)* designed by Intel to operate as slave to master CPU 1 Kbyte program memory (mask programmed ROM in 8041A UV erasable EPROM in 8741A) Read/write memory 64 bytes 2 I/O ports Upgraded versions of earlier 8041/8741 8041A/8741A feature 2 data bus buffers 8-bit (user definable) status register and self clearing interrupt outputs

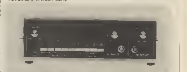
(iv) *2920 Analogue Signal Processor* developed by Intel Major functions are software controlled Contains D/A A/D convertors high speed 25 bit digital processor EPROM scratch pad RAM Accepts analogue input signals (0 to 10 KHz) digitizes processes under program control and re converts to analogue for output. Accommodates 4 analogue inputs and 8 outputs Intel SP20 support package available

(v) *Intel 8291 Talker/Listener and 8292 Controller* (both microprocessor controlled) for CPU to CPU (8080 8085 8086 8048 8748) communication over General Purpose Interface Bus (GPIB) 8291 controls data transfer handshake protocol device clearing talker listener addressing procedures both serial and parallel polling schemes and will trigger service requests 8292 prevents destruction of data transmission in transit monitors events on GPIB and responds to service requests after an interrupt

BRAND NEWs



NM4/95 MMU CPU and memory



The Model 5001 Universal Timer Counter from CSC

(vi) *Intel in 5034 Plug in Memory* for DEC PDP 11/04 and 34 computers 18 bit word length (including 2 parity bits) 32K 48K or 64K cards on a single Hex height card Cycle time of board is 500 ns with Read/Write access times 410 ns/320 ns respectively Automatic circuitry refresh on board transparent to user

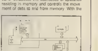
(vii) *IMB-101 1 Megabit Bubble Memory Board* for Series II development or other system employing Intel MULTIBUS BUS structure Developed by Intel IMB 101 employs 7110 megabit bubble memory device and can be used with ISIS II operating system Incorporates on board error detection and correction 8085 CPU acts as memory controller and communicates with development system CPU via registers using I O commands (See Brand News 3 4) **OEMs**

ZILOG

Extended Processing Architecture Zilog has announced previously undisclosed features of its Extended Processing Architecture for the Z8000 16 bit microprocessor The features provide for the extension of the Z8000 instruction set through the use of special purpose processors which Zilog calls Extended Processing Units The Extended Processing Units that Zilog is planning for future introduction into the Z8000 family have not been named

In general an Extended Processing Unit (EPU) is dedicated to performing complex and time consuming tasks in order to unburden the CPU Typical tasks suitable for specialized EPUs include floating point arithmetic database search and maintenance operations network interfaces graphics support operations — a complete list would include most areas of computing EPUs are generally designed to perform their tasks on data resident in their internal registers Moving information into and out of the EPUs internal registers as well as instructing the EPU as to what operations are to be performed is the responsibility of the Z8000 CPU

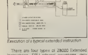
The Z8000 CPU normally fetches instructions calculates the addresses of operands residing in memory and controls the movement of data to and from memory With the Extended Processing Architecture the Extended Processing Unit will monitor the activity on the Z8000 Address/Data (AD) and Status lines If the instructions fetched by the Z8000 latch the instruction (there may be several different EPUs attached to one Z8000) An ID field in the instruction will select a particular EPU then both the Z8000 and the indicated EPU will proceed to process the instruction



Typical extended processor configuration

If the Extended Instruction indicates a transfer of data between an EPU s internal registers and the main memory then the Z8000 calculates the memory address and generates the appropriate timing signals (Address Strobe Data Strobe etc) The data transfer itself is between the memory and the EPU using the AD lines If a transfer of data between the Z8000 and an EPU is indicated by the Extended Instruction then the transfer occurs in a similar fashion between the Z8000 and the EPU

If the Extended Instruction indicates an internal operation to be performed by the EPU then the EPU begins execution of the task and the Z8000 will be free to continue on to the next instruction in the program memory. Processing proceeds simultaneously on both the Z8000 and the EPU until a second Extended Instruction is encountered by the Z8000 that is directed to the same EPU (if more than one EPU is in the system all of them can be operating simultaneously and independently). If the EPU is still executing the last Extended Instruction the EPU temporarily suspends instruction fetching by the Z8000 through the use of the STOP line on the Z8000



Execution of a typical extended instruction

There are four types of Z8000 Extended Instructions EPU internal operations data transfers between memory and an EPU data transfers between an EPU and the Z8000 and status transfers between the EPU and the Z8000 Status Flags. The last type is useful when the program must branch based on conditions determined by the EPU. Six Z8000 opcodes are reserved for Extended Instructions. The action taken by the Z8000 upon encountering these instructions depends on a control bit in the Z8000 Flag and Control Word (FCW) register. When this bit is set it indicates that the system includes EPUs and the Extended Instruction should be processed as described above. If the bit is not set the Z8000 traps (Extended Instruction Trap) so that a trap handler can emulate the desired EPU function in software

In summary the Extended Processing Architecture provides for an expanded Z8000 program memory space. Multiple EPUs can operate simultaneously with the Z8000 and the Z8000 may use any of its five main address modes to access data for the EPUs. Each EPU will be capable of expanding the Z8000 instruction set by more than 256 instructions and the data types manipulated by the Extended Instructions can be up to 16 words long

Figure 1 shows a typical system configuration employing one or more EPUs. Figure 2 gives a step by step description of the execution of an Extended Instruction. The example shows a transfer of data between and EPU and memory

Z8000 CPUs that provide for the use of the Extended Processing Architecture will be available in the second half of 1980

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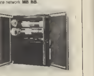

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UNDERSTANDING NATURAL LANGUAGE

Part 6

Previous articles in the series dealt with representation in problem solving planning a strategy pattern recognition and computers and speech

In the previous article (Issue 6) we considered some of the problems involved in identifying or recognising spoken sounds and phrases We noted however that a more useful goal for Artificial Intelligence might be to produce a machine which in some sense can demonstrate an *understanding* of a phrase or sentence presented to it in unconstrained natural language In this context 'understanding' can sometimes be an emotive word to use in relation to an inanimate agent such as a computer However in the restricted domain of natural language, 'understanding' should be taken only to imply that the machine generates a response appropriate to the inference that the intended meaning of a piece of text has been extracted from a string of input symbols and in this way we can avoid an abstruse discussion of the philosophical niceties of the nature of human understanding

The basic problems

Since we know relatively little – certainly at the level of mechanism – about how humans store knowledge which is utilised in their intelligent activities or how they understand a spoken or written statement, it is necessary when searching for an appropriate means of representing such a function in a computer-oriented way to turn to two very basic questions

First, what does it mean to say that a machine "understands" a statement communicated to it?

Second what elements can be identified as necessary in order to achieve an understanding?

The answer to the first question is relatively simple at least within the limited terms of reference defined above and can be established by means of specific examples Thus, we could say that some input text is understood if the machine correctly obeys a command which the text embodies if it generates an answer to a question framed within the input text, if on the basis of some input information the machine makes an inference relating to other aspects of its stored knowledge and so on

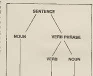

Figure 1

It is in trying to answer the second question satisfactorily that the fundamental problems underlying natural language understanding become most apparent for, at the most basic level all we can say is that 'understanding' involves interacting sources of information concerned with the definitions of things and/or the properties of things and/or the relationships among things Furthermore even if we reach a point where we can agree on a reasonable scheme which embodies some or all of these elements in the abstract, we must then proceed to a sufficiently well defined and precisely specified structure to act as the foundation for a computer based representation In this article we can do no more than indicate general methods for tackling natural language understanding by machine but it should be possible at least to illustrate some of the major problems and the main approaches to their solution

As we have seen the essence of understanding a textual input string expressed in natural language lies in generating a suitable representation of its meaning within the computer Once we have derived an appropriate 'knowledge structure in this way we can utilise this to compute actions, make inferences, answer questions or whatever is required

In general, there are two main sources of information which we can use to build up such a knowledge base The first of these derives from the utilisation of the linguistic rules and grammatical structure of language while the second relates to the meaning and usage of words and the conceptual relations among them The first type of information is generally referred to as *syntactic* information and the second type as *semantic* information We shall explore each in turn

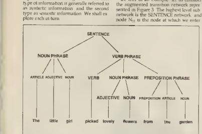

Figure 2

The understanding of a sentence expressed in natural language is greatly aided if we begin by analysing its structure in a way which makes clear how the words within it should be grouped and which should be considered together as functional units

A syntactic analysis of a simple sentence is fairly trivial For example the syntax of the sentence

Mary picked flowers

is easily derived and may be represented in the form of the tree structure shown in Figure 1

The same principles can be applied to a more complex sentence such as

'The little girl picked lovely flowers from the garden

to derive the syntactic structure shown in Figure 2

A convenient method for carrying out this type of syntactic analysis (a procedure which we call *parsing*) is to use an *augmented transition network* This is a network (or, more precisely, a set of networks) which defines the structural characteristics of a language and which can be used to guide the parsing process as a sentence is encountered word by word *The parser accepts in turn each word of the sentence to be analysed and endeavours to match it against a possible transition from one* node to another in the network Certain nodes require that progress through that network be temporarily halted while another subnetwork is traversed and this whole procedure continues until a successful termination is achieved

By way of an example let us consider the augmented transition network represented in Figure 3 The highest level subnetwork is the SENTENCE network and node N_{11} is the node at which we enter This particular subnetwork leaves little choice in the path we take In the parsing we must now look for a Noun Phrase and only when we have found and parsed this may we proceed to node N At the very start of the parsing procedure therefore control is transferred to the NOUN PHRASE subnetwork and we begin to search for a path through it If the next word in the sequence is an ARTICLE ("The for example) then we shall be directed along the arc from node N_{31} to N_{34} Alternatively encountering a word which is a NOUN will guide us into the transition from node N_{31} to N_{32} and so on

The analysis of the NOUN PHRASE continues until we exit from the control of the NOUN PHRASE subnetwork and control is returned to the SENTENCE network It should be noted also that depending on the sentence structure under consideration in order to traverse the NOUN PHRASE subnetwork it may in turn be necessary to suspend progress while control is passed to yet another network In this way analysis proceeds through the entire sentence with control being transferred from subnetwork to subnetwork as required As an exercise and to illustrate these basic ideas further use the grammar represented by the augmented transition network of Figure 3 to parse the more complex sentence

John saw the car in which his father was driving

While discussing syntax as an aid to understanding a number of important points may be made

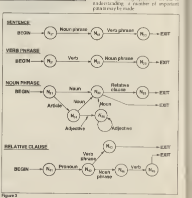

Figure 3

• [illegible] happen [illegible] satisfactory [illegible] consider [illegible]

[illegible]

It is clear that two possible interpretations of this same group of words may be made corresponding to the following rough paraphrases

(a) John used a stick with which to hit the dog

(b) John hit the dog which happened to be in possession of a stick.

A parser then would be able to return two different syntactic interpretations of this sentence both of which would be grammatically correct, and the correct choice between the two would require additional information to enable the identification of the grammatical analysis which is appropriate in a particular context

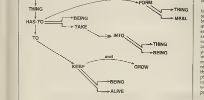

Figure 4

• 2 A sentence may be ambiguous in the sense that the same word may be used to convey entirely different concepts For example

John rowed to the bank

Here the sentence can be parsed in only one way but might have one of two different meanings because we use the word 'bank' to denote both a place where financial transactions take place and the edge of a river or lake (in fact other meanings of this particular word are also possible) In this example we would probably – because of the occurrence of 'rowed' in the same sentence – interpret 'bank' as the second of the two alternatives (unless of course we happened to know that John lived in Venice!)

Incidentally this particular example illustrates neatly the extra dimension of difficulty for an interpreter of spoken rather than written text (see Article 5 in this series) for in that case 'rowed' and 'rode' would be equally plausible with a consequently greater degree of confusion and ambiguity

• 3 A sentence may have an impeccable grammatical structure, and yet be completely nonsensical as in

The red blackbird spoke inside the frozen happiness

Similarly, we might also note the case of a nonsense passage which gives the impression of having a well-defined grammatical structure, such as the well-known

Twas brillig and the slithy toves did gyre and gimble in the wabe

(Lewis Carroll)

These illustrations show that a syntactic analysis alone will generally be insufficient to allow an understanding of natural language input. It is clear that understanding – even in the restricted machine context – requires some information about the meaning of words and the context of what is being communicated in order that appropriate manipulations of the available data may be accomplished In other words we need to build up a knowledge base which captures semantic information as well as syntactic information an observation which leads us conveniently into a brief discussion of semantic processing

Usa of semantic information

It is impossible to provide any one wholly satisfactory rationale for semantic information processing, since many views are possible and no single one is adequate in all respects We shall therefore look briefly at two possible approaches which have been particularly influential rather than attempt a detailed state-of-the-art survey

The essence of dealing with the semantic analysis of natural language is to find a suitable representation of the complex tangle of interrelationships among items in an appropriate knowledge base An early attempt by Quillian to formulate the semantic structure of natural language resulted in the concept of the *semantic network* In a semantic network items are represented by the nodes of the network which may be linked by various types of relationship The overall meaning of an individual word or concept (designated the type node) is implicit in this often complex structure, and is determined by the nodes (token nodes) and associative arcs which can be encountered by taking all possible routes from the type of node

A simplified example is given in Figure 4 which shows how a semantic structure might be derived to correspond to a definition of the word 'food' as 'That which a living being has to take in to keep it alive and for growth Things forming meals ' Although the graph symbolism is not explicitly defined here, a few moments of study with the semantic network will make clear the general principle of semantic representation in this form

Of course words with multiple meanings or usages would be given a number of

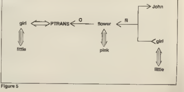

Figure 5

different type nodes "Bank" for example, would occur as BANK1 BANK2 BANK3 and so on, all linked but each having a well-defined semantic structure corresponding to the word's meaning respectively as the edge of a river a place where financial transactions occur a row or tier of items etc, each with associative links to other concepts to define the implications of these various meanings

As an example of the use of such a network, consider the sentence

John rowed to the bank

In seeking to understand its meaning the nodes corresponding to ROW and BANK would be activated and pathways from each explored Such a search would reveal an intersection between the two structures at points concerning rivers, water boats and so on and this would allow a reasonable interpretation of the sentence to be made

An alternative representation of semantic relationships may be found in a *conceptual dependency diagram* an idea developed by Schank. In this representation the meaning of a sentence is reduced to a set of explicit relations among a limited number of elemental or 'primitive' concepts Some examples of such primitives are the following:

CONC	**the concept of thinking about something**
PROPEL	**causing something to move by the application of a force**
PTRANS	**transference of possession from one owner to another**
ATRANS	**transference of some abstract information**
CAUSE	**indicative of a causal relation between two events**

In addition, the conceptual dependency diagram utilises a whole range of symbols to characterise the links among individual items which are expressed in the relations among primitives Thus, for example, the symbol

is indicative of a directed transfer of X from A to B

An example of a possible conceptual dependency diagram to represent the meaning of

"The little girl gave John a pink flower

is shown in Figure 5 Although this shows a relatively simple example and although as before the specific symbolic notation may be unfamiliar it serves to illustrate the fundamental principle of this semantic device

This is not the place for a critique or detailed comparison of the posible methods for semantic representation or a discussion of the relative importance of syntactic and semantic analysis It is worth mentioning in conclusion, however that the area of natural language understanding is currently one of the most active in the whole field of Artifical Intelligence and one where many researchers expect significant progress to be achieved over the next few years

Postscript

This is the last of this short series of articles on 'Topics in Artificial Intelligence Each article in the series has concentrated on one of the major areas of research in the field endeavouring both to indicate the main problems which must be tackled and to illustrate – at a practical level where possible – some of the techniques which are currently being developed to overcome them

Each article has been intended only as an introduction to its particular topic The extent to which the series has achieved its original aim must ultimately be judged by the extent to which readers feel motivated to follow up the introduction In any event, it is clear that Artificial Intelligence is now an established discipline, and one which is likely to provide exciting and stimulating challenges for many years to come ■

• Concluded For a related article see Computers and Everyday Language by Bill Black Issue 4

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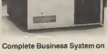

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IVERSON'S LANGUAGE

Getting answers from APL

The first article in this series introduced APL (A Programming Language)

You can now begin to use APL purposely, pose questions and get answers. In this chapter you will learn how to do simple arithmetic using the scalar primitive functions and how to store data in variables

APL has a specialised vocabulary. In the previous paragraph there is a string of three such terms "scalar primitive functions" We use these terms rather than a more immediately descriptive terminology for a similar reason that we use the correct APL characters – it enables you to access APL texts more readily. These terms will, of course, be defined as they are needed

Thus

- primitive function: a built in function such as + x – ÷
- scalar: when applied to a primitive function it means that it operated on scalars
- scalar: a single number or character. This will be more meaningful when we discuss vectors (lists) in the next chapter

SCALAR PRIMITIVES

Enter

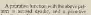
```
        7+8
15
        7×8
56
        8-7
1
        8÷7
1.1428571
```

These are of course familiar from ordinary arithmetic

Surprising as it may seem, the simple examples above form the pattern for a large number of APL primitive functions. In this context, the numbers 7 and 8 in their usage above are termed arguments of the primitive functions (in this case, the primitives are + x – ÷)

The common factor in question is that all scalar primitive functions have one or two arguments: if one, then the argument is to the right of the corresponding primitive (this class is discussed later); if two, then one argument lies to the left, and the other to the right of the primitive

The pattern is



A primitive function with the above pattern is termed dyadic, and a primitive function with one argument (discussed later) is called monadic

Here are two more primitives. Try to guess what they mean by keying in the following

```
        3⌈9
9
        5⌈8
8
        6⌈5
6
        2⌊3
2
        2⌊2
2
        9⌊8
8
        10⌊11
10
```

The first primitive is called maximum and the second is called minimum. Clearly the result is the smaller of the arguments. The pattern is identical to the other, more familiar, primitives

VARIABLES

To keep the result of a calculation a variable is used. This is simply a name containing information. Enter

```
        SUM←9+8+7
        SUM
24
```

The left-pointing arrow assigns the result of the calculation to a variable SUM. To display the contents of a variable we simply enter it – ie type the name, return

Try the following examples

```
        FRED←1 2+4
        MINUS←10-6
        NEW←FRED+MINUS
```

Now display the values of FRED, MINUS, and NEW. You will get 3 4 and 7, respectively

If you enter a variable name which has not been assigned, an error results. Enter

```
        XYZABC
VALUE ERROR
        XYZABC
        ^
```

APL reports VALUE ERROR because XYZABC has no value

TWO NEW SYSTEM COMMANDS

Enter

```
        )VARS
FRED MINUS NEW SUM
```

– a list of variables in ASCII is displayed. For a variety of reasons, it is often desirable to erase certain variables. This is achieved as follows

```
        X←1
        X
1
        )ERASE X
        X
VALUE ERROR
        X
        ^
```

'VALUE ERROR' is returned because X no longer exists in the active workspace. Generally, we may erase a number of variables in one instruction, viz

```
)ERASE X FRED MINUS NEW
```

One or more spaces must be typed between each variable name

MORE ON VARIABLES

Once a variable is assigned, it can be used as an expression, as was done above. A few examples follow (*next page*)

APL/ASCII: ← ↔ _[underline]; *ABCDEFGHIJKLMNOPQRSTUVWXYZ*↔
abcdefghijklmnopqrstuvwxyz ÷↔%

APL/ASCII: ⌈↔*S* or max; ⌊↔*D* or min

APL/ASCII: ← ↔ _ ;)*ERASE*↔)erase; ÷↔%

APL/ASCII: ×↔#; ÷↔%

APL/ASCII: × ↔#; ÷↔%

APL/ASCII: × ↔#; ← ↔ _

```
[illegible]
[illegible]
[illegible]
[illegible]×(1+RATE÷100)*TIME
[illegible]
```

You may have guessed what the new primitive (*) does. To confirm enter

```
      2*3
8
      3*2
9
      5*2
25
      3*3
27
```

The above session returns the amount after 10 years of 100 invested at 12% p a

We now give the rules for forming variable names

- * A variable name may comprise alphabetic characters and digits only,
- * The first character is alphabetic

Thus A1 ABC ZACHARIAH are permissible, 2A A/N ABC 3 are not

APL EXPRESSIONS

An expression is a sequence of variables, constants and primitives In principle APL specifies no limit to the number of operations allowed in an expression although there are practical restrictions such as the physical width of the screen and the intelligibility of an expression

We now consider the rules for evaluating APL expressions APL is very simple in this respect and has one principal rule, namely

> *The right argument of a function is the entire expression to the right of it

To illustrate consider

```
      6×7+8
90
```

Think of this as "6 × times something" where "something" is 7 + 8 ie 15 Thus the expression evaluates to 90

Two more examples

```
      10÷7-3
2.5
```

This is "10 divided by everything to the right" and this is 7 3 Thus the expression evaluates to 2 5

```
      5×8-3×2
10
```

Expression is

```
      5 × EXPRESSION1
```

where

```
EXPRESSION1←8-EXPRESSION2
```

and EXPRESSION2 is 3 × 2 which is 6 EXPRESSION1 is thus 2 and the final expression is 10

An alternative and indeed more useful statement of this rule is

> * APL evaluates expressions from right to-left

We check that

```
      5×8-3×2
10
```

evaluates to 10 using this version of the rule

Step 1

```
      3×2
6
```

(rightmost part)

Step 2

```
      8-6
2
```

Step 3

```
      5×2
10
```

Before you proceed any further check that the following examples evaluate consistently according to the two versions of the rule namely

> * The right argument of an APL function is the entire expression to its right
> * APL evaluates expressions from right to left

```
      8×9-9×7
¯432
      5÷3÷2
3.333333333
      6+0.5×9+8
14.5
      8×7×6-5×4-3
56
```

Using version 1 of the evaluation rule as the last example is quite laborious, and the right-to-left rule is easier to apply in this case Presumably – using version 1 – you worked through like this

```
EXPRESSION←8×EXPRESSION1
EXPRESSION1←7×EXPRESSION2
EXPRESSION2←6-EXPRESSION3
EXPRESSION3←5×EXPRESSION4
EXPRESSION4←4-3
```

At last

Now we must reverse this

```
EXPRESSION4←1
EXPRESSION3←5×(EXPRESSION4←1)
EXPRESSION2←6-(EXPRESSION3←5)
EXPRESSION1←7×(EXPRESSION2←1)
EXPRESSION←8×(EXPRESSION1←7)
EXPRESSION
56
```

Utilising the right-to left rule is easy

```
      4-3
1
      5×1
5

      6-5
1
      7×1
7
      8×7
56
```

Summing up on the two methods the right to-left rule shows us how to evaluate expressions whilst the "everything-to-the-right of a primitive is its right argument" statement tends to be of more theoretical value However for simple statements this latter way of viewing it is marginally easier

USING PARENTHESES

We have seen that there is no hierarchy of primitives in APL such as 'multiplication before addition" in other computer languages There is a good reason for this – there are too many primitives to make a hierarchical scheme feasible

However, it is often desirable to alter the natural order of evaluation, particularly when forming the left argument of a function and this is achieved by using parentheses which usage is governed by

> * An expression enclosed in parentheses is syntactically equivalent to a single argument

In say, 8 (3+4) - 7+6 7+6 is evaluated first to give 13 then (3+4) is treated as a single value and evaluated Next this result 7 is combined with 13 to form 7/13ths and this is the denominator for 8 to give the result (14 2857)

Thus, you should use the right-to-left rule – even within parentheses – until you encounter a right parentheses and then proceed within the parentheses as if this were a separate expression keeping the partial evaluation of the main expression in abeyance until this is done

In practice the use of parentheses occurs most frequently in conjunction with noncommutative operations like division What is meant by this is whilst addition

---

```
APL/ASCII: × ↔ #; :↔%; (UPPERCASE)↔(lower case)      APL:     ÷ ×      APL:     ÷
                                                    ASCII:   % #      ASCII:   %
```

for example is indifferent to which is the left argument and which is the right·

```
      3+4
7
      4+3
7
```

division, for example gives a different answer of course,

```
      7÷1
7
      1÷7
0.142857143
```

Thus if we wish to find the average of the 6 numbers 1 6 9 8 7 3 we must enter

```
      (1+6+9+8+7+3)÷6
5.66666666
```

The parentheses are necessary because we are forming a left argument and we cannot transpose arguments

(what will happen if you enter

```
      1+6+9+8+7+3÷6
```

?)

WRITING EFFICIENT APL

APL 'style is an interesting subject. Some programmers enjoy testing their ingenuity writing complicated expressions in one line – indeed the "one liner" has achieved a certain amount of publicity. APL is often considered consequently to be incomprehensible. Whilst this is not strictly true it is certainly the case that APL can be made more opaque than other languages very easily (It is also true that an APL system can be made far more comprehensible than any other – see APL in Exposition K E Iverson.)

Good APL coding is achieved by developing a consistent style, and one easy and effective way of attaining this is dealing with parentheses in a logical manner. Basically parentheses should be avoided because they interrupt the smooth flow of evaluating a statement in one's mind. Let us state a proposition which you may like to reflect upon

> * The only nontrivial use of parentheses is in forming the left argument of a function.

We have discovered that a primitive is commutative (left and right argument interchangeable) or noncommutative. Respective examples of the two classes are + and -. This gives us a basis for avoiding parentheses and you should develop the habit of seeing whether this may easily be done. Of course there is no point in being too sweeping here, nor of distorting an expression so much that it becomes more difficult to read. We conclude with an example

```
      (3+4)×5
35
```

can be written

```
      5×3+4
35
```

with advantage, but in

```
      (6+7+8)÷3
7
```

they are necessary

EXERCISE

1 Enter the command)VARS. Now set up the following variables which give a worker's pay details

```
      TAXRATE←35
      GROSS←150
      STOPPAGE←20
      HOURS←37.5
```

Now enter)VARS again

2 Based on the variables introduced in Ex 1 calculate

(a) the gross hourly rate. Call it GRATE

(a) total stoppages if these comprise STOPPAGE plus tax at the rate of TAXRATE % on GROSS STOPPAGE,

(c) actual hourly rate based on actual pay and hours worked

3 If your expressions in (2) contain parentheses, can you eliminate any of them?

4 Enter the following explaining any error message returned

```
      A
      3+C
      X+
      )LOAD RUBBISH
      )GET
```

5 Rename the current workspace with your initials and save it. Now erase all variables in your active area and check that)VARS gives a null response. Are these variables irrevocably lost?

6 Rewrite the following APL expressions without parentheses

```
      (A+3)×MULT
      (B-A)-6
      (A×B)+C-D
      (3+X)+(A÷B)×C
      D×(B+C)⌈A
```

7 As well as ordinary operators the assignment operator may be used within an expression just like any other. For example

```
      X←3+Y←7
      X
10
      Y
7
```

What are the values of X Y Z in the following cases?

```
      X←4+X←2×Y←3-Z←5
```

■

APL:	:	APL:	*ABC-Z*← ⌈ × ÷	APL:	←*XYZ*
ASCII:	%	ASCII:	abc-z_(underline)*S* or max ≠ ≯	ASCII:	_xyz

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STRUCTURE OR NO STRUCTURE?

Hierarchical structures were discussed in issues 1, 3 and 5 of our magazine in the context of database and management information systems. Many of the concepts introduced there apply to other structures as well. In this article we shall reverse our attitude and ask the challenging question: should information in a database be structured at all?

Structuring of information was seen to be useful in that it enables the user to "navigate" through the data by following the pointers defined by the structure, through what is referred to as an access path. In this section we shall not examine the advantages of structuring data, many of which must have become familiar to the reader. Structuring also has disadvantages. We shall jump into one side of the argument in order to point out the deficiencies in structured data.

We shall set the scene by introducing an example which, I am sure, is of interest to many of us: that of an accounting system comprising a nominal ledger and cash journal. I shall add to the flavour of the system by assuming that it is of particular interest to a multinational firm, and bring in some further components: countries, currencies, exchange rates.

In the particular system I have in mind, despite all efforts towards a unified coding system for the nominal ledger, it was found that there still arose wide anomalies because of the ever-changing requirements for the different countries in which the multinatonal had its offices. It was decided that, in order to prevent situations in which standardisation might become an undesirable constraint, offices in different countries should at least be afforded the possibility of their own choice of nominal ledger codes, though keeping in line with others whenever possible. In order to keep the matter fairly simple, we shall assume in our example that a unified coding was available.

There was a requirement for producing accounts reports for the local operating companies, each with its local currency, and also group consolidated reports in a common currency. Leaving aside for the moment the problems raised by fluctuating exchange currencies, a first simple-minded look at the system suggests alternative hierarchical structures for the three items taken into account: country, nominal code, journal entry.

One could define a single hierarchical file in which country was at the first level and, for each nominal code, the various journal entries associated with it. Alternatively, one could enter the nominal ledger codes on level one, then the country on level two, then the journal entry, and so

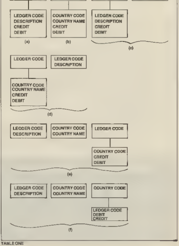


TABLE ONE

on This system is an oversimplified one, yet not the simplest Let us make it even simpler by deciding not to keep track of each journal transaction which by the way, is useful for audit trail but assume that all journal transactions are cumulated into their corresponding nominal code entry

Even then there are still many alternative structures as one is unlikely to just want to store codes but needs to enter some attributes for these codes For instance against the country code one may wish to enter the country name office address against a nominal ledger code one may wish to enter a description It can be seen that there are five possible structures each requiring one or more hierarchical or sequential files These are shown in Table 1

Let us assume that we wish to obtain a report on all cash credit or debit amounts for all nominal ledger codes in a given country We have seen earlier in previous articles how to obtain a single report using more than one file at the same time It will be an interesting exercise for the reader to try to write such a reporting routine for each of the possible structures in Table 1 This is certainly easy for structure (a), a routine can be written in no time A different routine slightly more complex for (b) and so on What of course is becoming clear to us is that the same program is unlikely to perform correctly in all the cases (a) to (f) of Table 1

Now suppose that for some reason because of changes or growth in the data, the database administrator decided to alter the structure used to another one Then he also has to alter his reporting program, and of course most of the other programs in the system Not a very desirable feature indeed as usually the writing up of programs involves much work and commitment of resources By examining the pointers in the access paths associated with each of the structures in Table 1 it can be verified that the last two structures will give rise to a number of alterations in programs if one was to permute these structures Ideally, one would like to change programs as little as possible when changes in structure of storage arise

The problem becomes more acute when stated differently Suppose that you were to purchase a database management information system of a hierarchical type develop a sytem and then find some years later that you are to move your data to a database management system which stores your data in totally inverted form a different type of storage structure Would you then have to Convert' each of your programs?

What would a program need in order to run without changes when storage is according to structures (e) or (f) of Table 1? It will, of course have to refer to the various fields by name rather than by their relative position in the file For instance if that is the case the program when run against the last file in Table 1 (f) need not know whether that file is organised according to case (a) or case (b) of Table 2

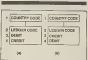


TABLE 2

Though that requirement is valid for any file envisaged even sequential it still does not enable us to use the same program for both (e) and (f) of Table 1 What then do we need? We first notice that the hierarchical structure is immaterial in this respect For instance the last file in (e) and the last file in (f) of Table 1 could have been devised as sequential files as shown respectively in (a) and (b) of Table 3

(a)	(b)
LEDGER CODE	COUNTRY CODE
COUNTRY CODE	LEDGER CODE
CREDIT	CREDIT
DEBIT	DEBIT

TABLE 3

The difference between the two file descriptions the hierarchical file shown in Table 2 (b), and the sequential file shown in Table 3 (b) can be best understood when examining their access path on a small set of data Let us assume that here are two countries France (F) and UK (U) and that France has three account codes A1 A2 and A3, while the UK has two account codes B1 and B2, say Let us assume that at this stage, there is no chas against these codes The information just defined can be represented, according to structure (b) of Table 2 as follows

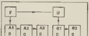


TABLE 4

F	F	F	U	U
A1	A2	A3	B1	B2
0	0	0	0	0
0	0	0	0	0

TABLE 5

On the other hand, the same information can be represented, according to the sequential case of Table 3 (b) as a flat file *(see Table 5)*

What is the difference between the two representations in Tables 4 and 5 from the point of view raised, that of making a program less reliant on the structure used? Clearly this would be easier with the sequential structure

Let us assume that now we go for a sequential structure of the kind in Tables 3 and 5 and hence accept the duplication in storage of some of the data (for instance F is repeated three times) We then ask ourselves whether the pointers shown in Table 5 are needed at all or whether one would rather use the following representation of the data as a sequential file as shown in Table 6

F	U	F	U	F
A2	B1	A1	B2	A3
●	●	●	●	●
●	●	●	●	●

TABLE 6

Of course, the difference between the files in Tables 5 and 6 is that the records in Table 6 are not ordered in any particular sequence It would be easier to write up a program to display the records in the sequence FA1, FA2 FA3, UB1 and UB2 by referring to a storage structure such as in Table 5 than in Table 6 However it is often the case that in a report one would like to see the data sequences in an order different from the one with which it is stored Hence, why should one worry about storing the data in any particular sequence and why not *always perform the sorting every time a report is requested?* In this manner users will develop programs that will not rely on storage structures The same programs could be more easily used on different databeses users will not have to be told which structure is embedded in the data That is a problem faced by a number of users of large data bases where they feel remote from the system s manager

There is a major drawback to the above approach of unstructuring data The drawback is not theoretical but rather practical On the one hand, one would create a large number of smaller files of which one needs to keep track. On the other hand, programs will need to access many different files in order to produce reports and will perform less fast, partly because of what has just been mentioned and partly because of the lack of usage of any access paths'

There are however many advantages to such an approach The smaller flat' sequential files will be easier to maintain and expand One can add more fields to a sequential file without prejudice to any program using it

Further advantages of the approach mentioned above can be stated Before doing that, it might be worthwhile mentioning that by now we have reached the state whereby our very small toy system consists of three unordered sequential files which we baptise as LEDGER, COUNTRY and LEDGER/COUNTRY files as shown in Table 7

In order to be absolutely clear about what information is ordered in the system thus obtained we emphasise once again that by examining Table 6, we are clear that the columns of Table 6 are unordered By looking again at the LEDGER/COUNTRY file it is again clear to us that we can easily accept that there is no real requirement that CREDIT comes before DEBIT or otherwise though somehow, beyond the user program which will refer to these files by names a systems program should be aware of which order is used in order to match properly the data to physical storage

LEDGER FILE	COUNTRY FILE	LEDGER/COUNTRY FILE
LEDGER CODE DESCRIPTION	COUNTRY CODE COUNTRY NAME	COUNTRY CODE LEDGER CODE CREDIT DEBIT
(a)	(b)	(c)

TABLE 7

Now, let us return to our small system in Table 7 Though it might be that every ledger code on the book is stored in the ledger file, which might have some appearance of permanence associated with it this might not necessarily be the case for the LEDGER/COUNTRY file, which might rather be looked upon as a working file Items may be deleted from the LEDGER/COUNTRY file or added as they arise, without prejudice to the LEDGER file If some ledger code does *not* appear in the LEDGER/COUNTRY file this in itself, might constitute a valuable piece of information On the other hand some new or misspelt ledger code might arise in some record newly entered in the LEDGER/COUNTRY file This is spotted at the validation stage or later through a report either method using file matching of the LEDGER and LEDGER/COUNTRY file Again this in itself constitutes a valuable piece of information dictating some new action to be taken either to increase the entries in the LEDGER file, or to amend the wrong entry in the LEDGER/COUNTRY file

COUNTRY CODE
LEDGER CODE
DESCRIPTION
COUNTRY NAME
CREDIT
DEBIT

TABLE 8

The ideas explored in this article are the ones upon which the relational database concepts are founded though what we have said so far by no means describes the relational data theory and methodology We shall attempt a brief description of these in the next section

Relational Database

The basic concept is that of relation, and to put it briefly, a relation is a file of the kind described in Table 7 The file is seen as a relation between the various fields that make it

When the information to be integrated into a database is examined an essential process of 'normalisation is undertaken What does this mean? By examining the files in Table 7, we can see that for each file some field may be singled out as a 'key field As a matter of fact, we have chosen to display it as the first field in each file, but, though this is not absolutely needed it might prove a useful convention to follow Situations in which more than one field is used as a key are not excluded, and one can then speak of primary' and secondary keys, but we shall not pursue that theme A key is meant to identify a record in a file uniquely By examining more closely the LEDGER/COUNTRY file it may be noticed that what I said earlier about a key is not quite true, and that in this case the key is made up of more than one field It is made up of the concatenation' of the two fields LEDGER CODE and COUNTRY CODE More generally it may be made up of the concatenation of a number of fields well identified One would like to in a record of file enter only that information that is relevant to the key For instance if we were instead to integrate the three files of Table 7 into a single file shown in Table 8 one sees immediately that some problems will arise when examining the corresponding data in Table 9

F	U	F	U	F
A2	B1	A1	B2	A3
A2 DESCR	B1 DESCR	A1 DESCR	BS DESCR	A3 DESCR
FRANCE	UK	FRANCE	UK	FRANCE
●	●	●	●	●
●	●	●	●	●

TABLE 9

The reader may wish to examine independently the problems that might arise All we shall say here is that the normalisation process is a process of converting information which might be presented to the designer as shown in Table 8 into the kind of representation shown in Table 7 It might be worth stating that even if one does not foresee that because of practical difficulties the final version of a system will be according to the relational database approach the analysis of the information according to this approach provides much insight into the nature of this information and a better understanding of the practical way of representing it as data

Extensions to the ideas just mentioned are being currently explored Further enquiries into the nature of the information of Tables 8 and 9 might lead to a wish to normalise it even further and only to associate one field with each key so that a file would consist of basically two elements A fairly deep ontological theory is being pursued We shall not examine these aspects here

Finally I should mention that what I have presented so far is a static picture of the system at one particular moment in time A good deal of thought is to be given to the time-evolving and varying nature of the information and of its representation as data The next problem that ought to be examined, very briefly here is of the kind of language, perhaps very near English that ought to be used with a relational system There are two approaches as to how one can make queries to the database One approach which is termed relational calculus would attempt providing the user with a language that obtains some piece of information by searching through the related files in order to locate just that amount of information One would search for instance for the CREDIT amounts association with account code A1 in the country F

The second approach for answering the same query is termed relational algebra It operates on whole files by putting them together, creating new temporary files, then eliminating what is not needed until it is narrowed so as to contain only that information required for answering the query We shall not carry on any further and urge the reader at this stage to pursue the ideas proposed here in analysing information according to the relational database approach in any case Because of some practical difficulties we have found it often useful in practice to make usage of management information systems exploiting structure while at the same time keeping as near as possible to the relational database attitude ■

• *Concluded The first article in this [illegible] series appeared in Issue 1*

THE HELMSMAN

Series

[illegible] cybernetics [illegible] management [illegible]

[illegible] thing about the [illegible] is that it [illegible]

Albert Einstein

People think cybernetics is • Automation theory • Feedback • Moon Rockets theory • Computer theory • Man machine interaction • A philosophical doctrine • Brain study • Electronic organs • Complex mathematical logic • Mystery • Something very complicated

In order to dismiss some of the myths surrounding the science of cybernetics and its application in management this series has been written I hope to demonstrate a number of essential cybernetic concepts and techniques

Although the importance of thinking cybernetically in management circles has been recognised for some twenty years it is still not widely applied in managing organisations However I believe that in the current national crisis of adaptability cybernetic thinking will make a significant contribution to improving decision making in the 1980s

Towards thinking cybernetically

A prime task of management

A prime task of management is to ensure that the organisation it manages is adaptive The concept of adaptation in this context implies

- a Maintaining the *external* relationships between the organisation and other systems with which it interacts
- b Maintaining the *internal* relationships between the individuals and groups which constitute the enterprise as a human system

Thus the adaptation process required of top management is to provide managers and supervisors with an organisational structure and working environment which enables them to

(i) **learn new responses,**
(ii) **learn new skills,**
(iii) **learn to pursue new goals,**
(iv) **learn to avoid and control business environmental disturbances**

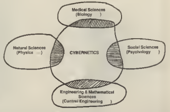
The effective management control system (containing people) has the following fundamental characteristics

(i) **It is highly adaptive**
(ii) **It is capable of self-organisation and learns from the environment in order to respond effectively to particular disturbances**
(iii) **Decision-taking responsibilities may change as a result of circumstances (ie be determined by who gets what information first and the nature of that information)**
(iv) **The stability of management control systems cannot be predetermined — it is a function of many influences**

The nature of control

In everyday conversation the word control" has a variety of meanings It is frequently used in the context of one person dominating another that is in a coercive sense

Stafford Beer (1972) writes of control as the machinery for the implementation of decisions one of the three functions of management that have intellectual content policy-making decision taking and control *Sherwin* (1957) in describing the meaning of control points out the essence



Note Shaded areas indicate the inter-disciplinary nature of Cybernetics

Figure 1 Cybernetics and related sciences

of control is action which adjusts operations to predetermined standards He emphasises that the basis of control is information in the hands of a manager

The author [illegible] conferences held at Loughton College Essex included one on the impact of the new [illegible] on administrators Seen in the photograph are some of the delegates and (in the front row [illegible] from left) Tony Atkinson Secretary of the International Word Processing Association [illegible]

Control as it occurs in the management of social systems such as business organisations is essentially the same basic process as is found in other systems such as physical or biological

Management theorists

Management theorists have developed their ideas on systems through the growth of an interdisciplinary approach to organisational comprehension using the basic ideas about systems which are to be found in engineering biology sociology physiology and psychology Cybernetics incorporates these subjects as shown in Figure 1 *George* (1977) points out that it extracts from whatever context that which is concerned with information processing and control

The present writer considers the interdisciplinary nature of cybernetics In the study of management systems invaluable as it deals with the analysis design and functioning of systems in a somewhat more general way than the particular specialist Thus it eliminates to a certain degree the influences which a particular specialist in one particular area of management might have in investigating a management system

"Kubernetes"

Norbert Wiener (1948) wrote

> *'We have decided to call the entire field of control and communication theory whether in the machine or animal by the name Cybernetics*

The word stems from the Greek 'Kubernetes' or Helmsman and so has the connotation 'director of' Cybernetics involves communication and control Wiener showed that many types of systems control themselves by information feedback which discloses errors in accomplishing goals and initiates corrective action This means that systems *feedback* information is compared with a standard

Cybernetics defined

The founder of Cybernetics Norbert Wiener (1948) defined it as – 'the Science of Communication and Control in the animal and the machine

Norbert Wiener a brilliant mathematician published a book with this title in 1948 The book is mainly mathematical and bears little direct relationship to business organisations But since then there have been many rival definitions and the scope of this new science has been broadened so much so that some thirty years after the best known Management Cybernetician, Stafford Beer (1974, 1979) defined it as –

> Cybernetics is the Science of effective Organization '

However, the Greek term "KUBERNETES" (the steersman of a ship) had been used by Ampere in 1834 for the "Science of the Control of Society

A meaning of a System

The field of cybernetics is concerned with both living and inert systems In cybernetics we are looking at things such as anti-aircraft guns computers, groups of people companies and the like as systems

'System is unfortunately an overworked word The important notion it represents is a set of interrelated things of which no subject is unrelated to any other subject Such a set exhibits the characteristics of 'Wholeness' and has fundamental properties namely structure behaviour and functioning

We can examine the basic idea as follows In Figure 2 there are six things collected together These things may be called entities According to Webster's Collegiate Dictionary 1970 an entity is something that has objective or physical reality and distinction of being and character In this figure these entities are put together but they are separated from the rest of the world and nothing more about them is known to us Since they are not related to each other (the absence of arrows) such a collection of entities cannot be taken as a system

The same six entities (1 2, 3, 4, 5 and 6)

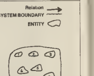


Figure 2· Collection of entities

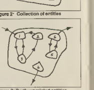


Figure 3 Partly unrelated entities

are put together in Figure 3. In this given set of entities there is some relationship as shown by arrows. Entities 1, 2 and 3 are connected together. Similarly entities 5 and 6 are connected together but the entity 4 is not connected to any other entity in this given set. Seemingly there are some relationships among these entities but they are not completely (either directly or indirectly) connected together to form a 'whole'.

Cybernetics

In the [illegible] complete relationship such a collection of ent[illegible] be called a system.

In Figure 4 the same set of entities are connected together forming a whole. A whole which exhibits the properties which none of its parts or subjects has. In addition to this, a system consists of a number of sub-sets or sub-systems. A sub-system is an element or functional component of a larger system which fulfils the conditions of a system in itself but which also plays a role in the operation of a larger system. It implies that any part of a system can be considered as a system in its own right. This leads us to the fact that each entity in a given system may be regarded as a sub-system. Figure 5 illustrates this.

Here, Entities 1, 2 and 3 form a sub-system A and Entities K, L, M and 5 form a sub system B.

Thus both sub-system A and sub-system B are two separate systems within the total system. In the same way we can consider an entity as a sub-system which is after all a part of the system to which we attribute certain properties.

Every system has its environment. The concept of the systems environment is connected with what belongs and does not belong to a given system. So one has to determine the boundaries of the system. Let us consider the world around us as a total system in which there are infinite number of groups of entities and relations. How to draw boundaries for sub systems within this wider system very much depends on the purpose of the investigation and on a number of criteria which entities have to fulfil to be considered part of the system. Thus, once the purpose of the inquiry and the appropriate criteria have been established we must then select a group of entities and their relations from the wider system. This selected group of

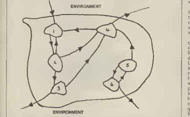


Figure 4

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Cybernetics

entities and their relations in [illegible] *tem and something else* within the wider sys tem is the environment of the selected system

Thus, theoretically, everything that is not included in the selected system is its environment, but in real life situations we are concerned with the system's *relevant environment* ie a set of entities outside the system which interest us in the environ ment The manner in which a system influences its environment depends in general on the properties of the system itself as well as on the manner in which the environment acts on the system Con versely the same applies to the environ ment

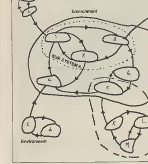

Figure 5

The system and its environment act on each other – they interact According to the type of interaction between the system and its environment systems may be broadly classified as –

- **Closed Systems** – systems which are considered to be isolated from the environment – no interaction occurs
- **Open Systems** – systems where we consider all the influences of the environment on the system and vice-versa – complete interaction

All the influences of the environment on the system are considered as stimuli and all the influences of the system on its en vironment as responses By structure of a system, we mean the relationships of entities withi[illegible] we under[illegible] spon[illegible]

Without going into detail it should be mentioned that we observe qualitative dif ferences in the behaviour of systems Some behaviours are deterministic – output is completely determined by input Thus they can be described adequately in deterministic terms Such systems are re latively *independent* of the *environment* – the environment usually acts as a *trigger* to sequences of actions which are stereo typed

In some systems the outputs are impos sible to determine from the inputs *They are dependent on environmental conditions* Such systems are known as probabilistic

Summing up therefore we can de scribe a system as a set of sub sets (or things or elements) which have some connection, and which exhibit the charac teristics of 'wholeness The idea of a sys tem in everyday life is familiar but, in cybernetics the behaviour and function ing of systems is considered with greater rigour The binding entity is inter com munication that is the means whereby information flows from one element to another

In cybernetic words Information Communication and Control have spec ific meanings The cybernetic meaning of these words will become clearer as the series continues

Cybernetics, according to Wiener was developed to class communications and control together Why did he do this? *Wiener* (1950) wrote

> 'When I communicate with another person I impart a message to him and when he communicates back with me he returns a related message which con tains information primarily accessible to him and not to me When I control the actions of another person I communi cate a message to him, and although this message is in the imperative mood the technique of communication does not differ from that of a message of fact

This suggests that Wiener gave the greatest importance to the study of mes sages, in our understanding of –

- Conversation between persons
- A man instructing a machine
- A machine instructing a man
- A machine instructing another machine(s)
- A formal sub-system instructing another formal sub-system within the same organisation
- A formal system instructing another external formal system

In summary this first article sets the scene for looking into management pro cesses through Cybernetic Spectacles' The next article is concerned with the cy bernetic language and its methods as ap plicable in the management of business organisations ■

M Saeed Sheikh M Sc Dip Org Ps Cert Ed AIDPM is at the Loughton College of Further Education Essex He is an active organiser of seminars aimed at modernising the outlook of management

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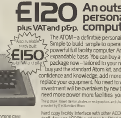

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The picture shown demonstrates mixed graphics and characters in three shades of grey provided by the Standard Atom

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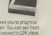

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ACCESS TO MONEY

Deciding to buy a computer and choosing the best for his needs is only half the battle for the enterprising small businessman. As his accountant is sure to remind him, nothing in this world is free – and there is a right way and a wrong way of paying for a computer.

At times of high interest rates and tight money the small businessman will want to plough as much self-generated cash as he can back into his business. Whether his new computer costs £2 000 or £20 000 that money would be better spent earning a return by being employed as working capital in the business itself. But where can he go for cheap medium term loans when bank rate is running at record levels and the banks themselves still look on small companies with stubborn distrust?

Leasing is the latest buzzword in the corridors of the major finance houses and it can offer real advantages for small businesses. **Hire purchase** too can have its advantages, particularly the kind which is specifically geared to the needs of purchasers of industrial capital equipment. On the other hand **outright purchase** can be a suitable option for some companies and, under certain conditions **a bank loan** might be more suitable. The problem is how to decide between the various options and what long-term considerations should the small businessman or woman bear in mind?

First, for any small company it is essential that allowances against corporation tax are fully utilised. Manufacturing industry in the UK can claim 100 per cent allowances against tax on plant and machinery and any company not making the most of these allowances is effectively throwing money away – worse, it is handing it over to the tax man. The owner of any business must determine his or her tax commitments over the next few years and if the company's tax shelter is not fully utilised then any capital equipment should be acquired in a way so as to do this. Basically that means purchasing equipment and gaining title to it as sole owner.

On the other hand, it may well be that the fast growing small company has already fully utilised its tax shelter. The owner will therefore be unable to deter against taxable profits the purchase price of its computer. This is where leasing comes in, effectively transferring the tax allowances to a company (the lessor) that has an existing tax shelter. In turn that company lends the equipment to the small businessman (the lessee) for a period of years – which can vary according to individual requirements. By enabling the lessor to make use of part of its own tax shelter, some of this benefit is passed back to the lessee by means of rentals which are significantly lower than would be the case in a simple rental arrangement.

Another important consideration is the price of money. No one likes to predict inflation and interest rates, but moves in these in the coming years will affect very significantly the relative merits of the different methods of acquiring a computer system. Although it is safe to assume that inflation rates will not go into reverse – adding to the value of the pounds in our pockets – it is very likely that interest rates will fall from their present all-time high. Leasing has its advantages over other methods of purchasing an asset simply because rentals are related to the original cost of the computer. But for companies that wish to utilise their tax shelter no such easy option exists. Bank loans are usually fixed at a certain percentage above MLR (Minimum Lending ate), so if MLR drops so too will interest charges. Hire purchase agreements are very expensive during times of high interest rates – at present they work out at around 25-28 per cent per annum – but a drop in MLR could mean that HP becomes a very much more attractive alternative for small businesses.

Businessmen and women who wish to flatter their own vanity by owning their own computer will get no satisfaction from leasing. The lessor always retains title to the asset and the lessor remains always and only the user. But in the computer field that can be a positive advantage. With its own rapid growth, a small business may find that its old computer system is inadequate and, worse, with advances in hardware and computer technology, the small business may be better served by a new model. Businessmen and women must look well ahead and try to assess their requirements for the future – they must decide how long they will use their computer before they trade it in for another.

Leasing arrangements come in two varieties – the operating and the finance lease. The former is a short-term lease based on the assumption that the user will outgrow the system in time. The latter is a longer lease (usually five years) which effectively covers the whole price of the computer (less the lessor's tax relief, plus a little profit for the lessor) which, after the term of the lease expires, is rented to the lessee at a peppercorn rental. The operating lease is more expensive than the finance lease because at the end of the lease period the lessor is left with a second hand computer, often outdated and always difficult to dispose of. Nevertheless the operating lease offers a high degree of flexibility which may be just what a fast growing small company needs.

Finance for small businesses is hard enough to come by at the best of times but with high interest rates, funds for development are even more expensive. Leasing and hire purchse offer small companies the opportunity to acquire the use of machinery without revealing this in their accounts either as an asset or a liability. That means that existing credit lines – overdrafts for example – are left unaffected. 'Off balance sheet' acquisitions cause sleepless nights for liquidators when lessees go out of business because the liquidators discover hitherto undisclosed commitments. But while a company stays in business this need not furrow the brow of the owner.

By now it should be clear that there are no rough and ready rules which determine which kind of purchase scheme best suits particular small businesses. The existence of tax shelter, the long-term needs of the company, changes in interest rates and existing finance arrangements all have an important bearing. Nevertheless something can be said about the simplest and most common method of acquisition, outright purchase.

The very small company, operating a business with limited computer requirements, may be interested in the new and rapidly developing 'personal' computers – the Commodore PET, APPLE and TRS 80 ranges. With dedicated software capable of elementary business functions such as nominal ledger, stock control, sales and purchase ledger and so on, the very small company can acquire a complete elementary system for as little as £2 000. Leasing companies will be unwilling to finance such a small purchase because of the finance companies' own management overheads. With interest rates as high as they are today, hire purchase will prove very expensive as will a bank loan. For the company with adequate tax shelter in these circumstances the answer will probably be outright purchase.

Leasing is one of the financial community's biggest growth industries. According to the Equipment Leasing Association it accounted for 11 per cent of all capital equipment investment in British industry last year. Add to that a significant amount of leasing by lessors who are not members of the ELA and the total comes up to perhaps 18 per cent of all investment in British industry. Leasing by members of the ELA grew by 48 per cent in 1979 to £1 8 billion but even that growth rate pales into insignificance compared with the 80 per cent growth experienced in 1978. The development of leasing has been largely at the expense of hire purchase and its relatively slower – but still very rapid – growth last year reflects the fact that indutry is investing in capital equipment at a slower rate.

Although motor car leasing has grown most rapidly in the last year, leasing of computers and office equipment remains the third largest single leasing sector with £315m of business in 1979 Growth in this sector has been slow recently largely due to some uncomfortable experiences which lessors faced in trying to dispose of secondhand and outdated equipment Another rather more controversial application of leasing is in the field of personal tax avoidance That is an area into which small businessmen and women enter entirely at their own risk.

For the small businessman who wishes to acquire a computer but cannot afford the time and trouble of threading his way through the intricacies of tax allowances and liabilities the following may offer useful rules of thumb

Leasing The end user never becomes the owner of the asset and cannot benefit from tax allowances This may suit the company that has fully utilised its allowances to the limit of its tax shelter Allowances are available to the lessor however, and some of this benefit is passed on to the lessee in the form of lower rentals This is equally the case if the small company pays corporation tax at the full rate or pays the lower small business' rate Benefits of leasing include

- Fixed rate financing
- Financing of 100 per cent of asset cost
- Improved cash-flow because rentals are lower than would be the case in a simple rental scheme
- Existing lines of credit are left unaffected

Purchase Methods

- Simple documentation
- Flexibility An operating lease enables a lessee to update equipment when necessary

Hire Purchase Hire purchase is often called lease purchase by finance companies in an attempt to persuade customers that it offers some of the advantages of straight leasing Unlike consumer hire purchase which usually requires 10 20 per cent deposit, lease purchase does offer 100 per cent financing but in all other respects the two methods are practically identical Lease or hire purchase will be suitable only for those companies which have unutilised tax shelter facilities available Benefits include

- 100 per cent allowances against tax
- Existing lines of credit are left unaffected
- Title to the equipment passes to the small business at completion of payments

Bank Loan Depending on the small company's relationship with its bank, it may be able to negotiate a bank loan for the purchase of a specific piece of equipment. It might involve the lengthy process of persuading a usually sceptical bank manager of the need and profitability of the new equipment and it will certainly affect the company's existing lines of credit At times of high interest rates it's difficult to think of any benefits from this means of purchase, especially for companies without tax shelter

Outright purchase is most common at the bottom end of the market and it can offer some advantages

- It may enable the purchase to be offset against tax
- It helps companies in planning cash flow
- For companies without growth potential but with excess cash it might reduce the effects of inflation on idle money It would be hard to imagine such a situation where it is not possible to do something more useful with the cash

A small businessman who wants to consider leasing, lease purchase raising a loan or outright purchase can feel more than usually confident of the advice of the big finance houses – most of which are backed by the clearing banks or merchant banks The finance houses are always happy to take a close look at the intimate details of any small company which approaches them for advice But the small business is well advised to shop around Rates and terms vary across the market, especially for the purchase or lease of computer equipment, and some companies are better geared for the particular requirements of the small business than others ■

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The objective of this excellent work is to point you towards a single supplier who will best look after you on hardware, software support and maintenance. Once you have worked your way through the eleven tables and understood what each is designed to prove it really succeeds very well.

The introductory text is good. All the points that ought to be made are set out very clearly. If you read this section carefully and understand it you won't go far wrong. The chief lesson to be learnt is that made in every other article on computer system selection: you need to choose the software first, then an established competent local supplier to deliver it, and lastly to buy a computer from him.

The eleven tables in very detailed. Information about any one supplier is spread across these tables.

Which leads to the first small criticism: not every supplier is in every table. You can perhaps infer that if you can find the particular computer you want mentioned under another supplier elsewhere in the table, that the points made there will apply. And if you cannot find it at all, you have to assume it has no languages, upgrade, on-line facilities or whatever.

As a survey it is most interesting. There are about 260 suppliers who are credible in the small business market. This list is similar but not exactly the same as the bi-monthly listing in *Which Computer*. Some of these have branches. It is not clear whether all these branches have the competence that the head office is stated as having. Ten sources have more than 20 branches and therefore probably have credible national coverage.

Many computers are sold by agents. The heavily advertised small micros with many agents are heavily edited to identify only those who can properly install business software. So the market leader for number of agents is clearly DEC PDP 11 with 34 sources. Runners up are PET (15), Northstar (13), Data General (13), APPLE (12), BCSL (11). There is a handy cross reference for the 27 systems sold in this way.

Some agents quote only one person available to handle technical questions. Most have more and this should be good, providing the particular one you get to work with you knows what he is doing and understands your problem.

There are 122 different computers on offer in the tables. They may or may not be enhanceable. 90 of them are nominated as having growth potential, some do not seem to grow very far. In general growth is more credible if you start around the £12 000 price tag.

The word small in the title 'Small Business Systems' has been taken fairly widely. The breakdown of systems to price ranges is as follows ('000 of £): (See below.)

About half of the suppliers quote the use of third parties for maintenance, sometimes the main distributor, typically DEC, but many quoting one of the six specialist maintainers. Most suppliers will install the systems using their own engineers in the first instance.

Sales figures quoted have to be taken with a pinch of salt, but are probably a sufficient indication of the impact on the market. Olivetti and Pet claim in the thousands in the UK. Jacquard claim 126 installations but over 1000 on order. Sixteen others have more than a hundred installations.

All the American [illegible] based systems [illegible] greater numbers of US installations. I don't know how [illegible] this is [illegible] mind that [illegible] and local support [illegible] for UK applications.

A second criticism. Many suppliers have not given details of sales figures. You can assume a zero figure if you wish. But neither ICL nor IBM have sales figures quoted, a zero figure does not seem credible here. Some suppliers have apparently not bothered to reply at all. Out of a list of 21 suppliers on another list I have, apparently 10 did not bother to reply to this Guide. I hope this is not typical of the rest.

An attempt is made to identify program packages offered. Nearly all offer Sales, Purchases, Nominal Ledgers, Invoicing, Stock Control and Costing. Many quote Payroll. There is no way of finding out easily whether these packages are any good. On the other hand if a supplier is quoting one of the more esoteric applications, it seems likely he has some special competence in this area.

Most suppliers are claiming Word Processing on their normal small business systems. It seems likely that not all of these are as good as on the specialist word processing systems.

Finally there is a list of 96 companies who offer consultancy. If you follow the guidelines given maybe you don't need them. But if you are still confused on how to go, this could be a good first investment to prevent future woe.

- *Richard Waller is an consultant with Pegler Management Consultants*

Price ('000 of £)	5	5-10	7-20	15-30	25-40	35-50	45-70	66-100	100-
Number of systems	72	120	185	144	83	83	81	43	37

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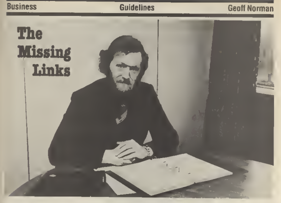

How the executive can sit down and get a clearer idea of what his business needs before rushing headlong into the market place

As more people who either run their own small business or are involved in running a small company become aware of the possibilities that microcomputing opens up they join the ranks of potential first-time users Apart from the evidence of the appearance of retail outlets in many towns and a host of micro systems houses the proliferation of pieces such as this one shows that there is an attempt to satisfy this market and to at least partially educate the new kind of buyer

However most of the articles which are intended to guide these newcomers round the pitfalls of buying a micro for their business jump directly from choosing which of their organisation's systems to consider for computerisation, to approaching possible suppliers I consider that two essential *intermediate* stages are missing from this progression *Instead of* the two steps

- **1a Decide which systems might be computerised, and pick a suitable one for the first implementation**
- **2a Approach potential suppliers of hardware and software**

the following in between steps are *more likely* to give you a cost effective solution, computerised or otherwise

- **1b Decide which systems might be computerised find out what the current running costs are and estimate these costs over the next three years**
- **2b Estimate the greatest likely savings and other benefits such as cash flow improvement, and better management information On this basis pick a suitable system for the first implementation**
- **3b Produce a functional specification for this first system**
- **4b Approach potential suppliers of hardware and software**

There is no way of removing the element of risk from an exercise such as this but it is *every* business man's job to take *calculated* risks After 2b or 3b the right decision might well be not to take step 4b at all I think that this is unlikely and have great faith in the kind of gut feeling which brings business men to the starting point in the first place and believe that microcomputers can make a massive contribution to the profitability of small concerns

However our new buyer has a lot to learn If he doesn't start right he will never give his computerisation a chance, and he should always be ready to abandon or postpone his plans for buying a micro if the facts conflict with his gut feeling By going from 1a to 2a in one jump he has no facts to weigh up

Step 1b might require no work at all but many small companies will never have extracted this sort of information until carrying out the current exercise In that case a useful purpose has been served even if these figures which obviously represent the theoretical maximum saving, are so small that the micro project is forgotten straight away In very small set ups first thoughts in this area might be of the sort Doing statements takes me a few hours each month' Assume that you could be earning money in that time and put a value on it Come up with the most accurate figure possible in pounds without making a life's work of it

Looking at 2b – well as I said, the obvious maximum is the same figure as 1b but a 100% reduction is very unlikely However we can assume that the systems under consideration are either ledgers or of the mailing list type On ledgers, assume that you will take the same time to enter transactions and carry out any basic control functions that the machine will cut the typing jobs to zero and that the miscellaneous jobs like filing will be cut in half Before the experts shoot me down, I know that this is highly empirical but the answer is going to be close enough to one which takes a lot more time to derive and any difference is not going to affect our decision making Maintaining mailing lists for instance is going to take little more time than typing an envelope for each new or amended address Even the slowest computer printer is going to produce a set of name and address labels with negligible effort compared to typing so here is a case where our 100% potential saving is within the limits of experimental error

There are bound to be unquantifiable gains such as the information spin-off the improvement in collections, and so on Fine leave these unquantified and let them tip your cost effectiveness balance if your planned computensation is not quite justifying itself This is reasonable because assuming the optimistic view that the business is going to expand, you can be sure that the computer will handle this expansion more efficiently than any manual system possibly could, so long as you get 3b near enough right

The choice of first system for computensation is not that easy in theory but the list is going to look like

- **Sales Ledger**
- **Purchase Ledger**
- **Nominal Ledger**
- **Payroll Gross to Net**
- **Mailing List**
- **Word Processing (eg for Report/Quotation production)**
- **Perhaps a couple more**

In practice our micro business man is going to take his pick from this list with no problems on the basis of his knowledge of his business For computer purposes he should pick the 'biggest' system rather than that which will necessarily be most financially beneficial at this stage Any layman can pick out his 'biggest' system, but if there is any doubt take the one with the largest file of *master records* ie customer list supplier list employees on payroll, etc If that is not conclusive decide between your top two on the basis of number of transactions posted in the busiest month Then favour cost-effectiveness Then toss a coin (This last technique never fails to come up with a clear-cut decision)

Hands up all those who haven't plumped for their sales ledger Invoicing, some sort of stock recording or payroll build up to gross may have topped the poll but those tend to be specialised and I would not advise micro business men to tackle these first – as I shall explain later

Guidelines

To justify step 3b let's look at step 4b

Hardware – the prices you'll see quoted in most advertisements are for a base configuration What you need to work out are the bits to *add on* to enable you to run your systems Some peripheral considerations are options some are not Unless you are thinking in mini micro terms the following are guidelines

- Get a *keyboard* that compares in feel and robustness with a typewriter this is the operator's contact with the machine and he/she must be happy with it
- Get a *screen* with clear characters on it that doesn't flicker, one that is literally easy on the eye
- To do any business data processing needs two *tape cassette/discette/disc devices Tapes are unlikely to be satisfactory on their own, so we have to do a sizing exercise on the discette/disc capacity required*
- *Printers* come in varying speeds and with varying numbers of characters per line Anything less than the normal maximum of 132 characters per line is liable to become a limitation at some stage, but the sizing operation should give a good idea of speed requirements This could materially affect the cost of the configuration although for most micro applications the slowest rating will suffice

Software – there are three choices – do your own programming buy a package, or pay someone to write bespoke routines The mini micro buyer is going to choose from the first two as the last is bound to be outside budget The purchaser of a *business* machine however may want to think of the third as a possibility

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Go to exhibitions such as Microsystems 80

The package route is the most likely of the three, and is the reason for my earlier advice to keep away from very specialised applications At this point it is immaterial which choice is to be made – the functional specification is the first stage of the do it yourself option an equally essential basis for the choice of a package, and the first step in obtaining a quotation for one-off programs

Let's assume that the sales ledger is the chosen system Find out and write down the answers to the following

1 How many customers have you?
2 Do any of them have more than one address?
3 What is the average total number of invoices posted per month?
4 What is the peak monthly invoice rate?
5 What is the average number of invoices per customer?
6 What is the absolute maximum number of invoices per customer in any month? (Many small firms are heavily dependent on a few customers who might receive eighty per cent of all invoices between four or five firms – if the software which you buy or the hardware, cannot cope with the files which this will require – forget it)

Points 7 to 10 are as 3 to 6 for credit notes These are bound to happen

11 Add item 6 to item 10 to give you the maximum number of lines which a statement will have to contain Add a twenty per cent margin of safety/expansion/error, and note that a statement might run to more than one sheet of stationery *(Continuation statements and the way they are handled by a system are a useful yardstick for the quality of a sales ledger system)*

12 What is the largest amount on any transaction?

13 What is the largest total on any statement?

14 Do you want to mix currencies in your ledger? This may rule out the practicality of a small-scale system It might be possible to run separate ledgers but it might not be practical to do so, and remember that the 'field sizes, (12 and 13) in lire for instance, are going to be much bigger than your UK ledger

15 How do you deal with VAT – every sales ledger system must have provision for at least three VAT rates preferably more if you want to distinguish between zero-rated and exempt (Note for later software shopping that any package or bespoke system which you buy should have simple maintenance routines so that you can respond to the Chancellor's whims *yourself* – rather than joining a queue for amendments which will be disproportionately expensive) Remember that exports are a further complication here

16 Do you have a discount structure? On what is it based – customer types turnover prompt payment? Some discounts affect invoice amounts so they are posted to the ledger already discounted, however others are deducted on payment and your computer system will have to cope with them Codify this structure, and quantify the proportion of transactions affected It this is small then posting of credit notes might suffice If the proportion is high you may have to rule out computerisation because the cost of programming negates any gains from picking your discounts up automatically

17 Do you have a requirement for area analyses, reps analyses month-by-month sales figures? Forget computer comparison with last year's numbers unless you are buying a sophisticated package or are prepared to pay heavily for bespoke programs

18 Play the numbers game with 17 *How many* areas? How many reps? etc, etc What is the maximum size of any Individual total under each of these headings? If the most any rep has sold in any month is say £9000, this is going to top ten thousand in no time, and even if you are saving space by restricting these numbers to round pounds you may just have altered a complete file structure

19 Do you know of any factors which will affect any of the above in the next, say, two years? If you do then guess what the numbers will be in two years time

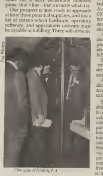
20 Is an open item system absolutely essential or will a balance brought forward system do the job?

21 Can you think of anything which I've forgotten? (Award yourself a lunch on the firm if the answer is yes because you not only know your present system well, you are also thinking in the right way and may just have saved your company the price of umpteen lunches)

Unless 17 and 18 above are unimportant you now have a list of criteria which the system you buy *must* fulfil If provision of a specific piece of management information was the unquantifiable benefit' which you were using to justify computerisation don t lose sight of the fact Remember that unexpected things might happen A customer from Eire might decide to drop in and buy something on the spot – he will have to be charged VAT on this invoice but not for any goods which he orders in the normal way and which are exported to him This might be so rare that creation of a short term separate account for this transaction is justified On the other hand a recent strike in Eire made communication so difficult that buying on the spot became a common occurence in one firm I know of and caused extensive re programming Some firms are in the situation of having to charge VAT on services supplied to overseas countries as a result of a mistake in the drafting of an EEC directive! If your intended sales ledger package automatically exempts customers with an overseas area code then it won t work under these circumstances

The message is that you must know *everything* there is to know about your system There is a spin-off in this because you will inevitably involve and motivate whoever does this work for you It you re running a very small set-up this may be the first time such an exercise has been carried out and you will certainly understand your business better You may even bring to light the procedure which was taking all that time to carry out manually, eliminate it and decide that you don t need to computerise after all In short quantify as much as possible If this looks like a fairly elementary numbers game that s fine – that s exactly what it is

Our prospect is now ready to approach at least three potential suppliers, and has a list of criteria which hardware operating software and applications software must be capable of fulfilling There will certainly be adequate hardware on the market and the costs will become clear now If there is no applications package which fits the bill, now is the time to get a *quote* from a number of progamming sources for one-off routines, or take the plunge of going it alone All the micro sellers be they retail shops, mail order, or systems house offer packages With our micro functional specification the buyer is *in* a position to say very specifically what he *demands* of the products on offer All reputable vendors will welcome groundwork of this sort, as it saves them time and gives them a much better chance of having a satisfied customer The less reputable of whom there are very few, or the less equipped or capable of whom there are rather more, are much less likely to take you for a ride If the system requirements are on paper and are made clear to the supplier from the outset even if the worst does happen you are in a much stronger position to obtain redress *Insist* on being given a customer list and do take the trouble to follow up as many of them as you possibly can Apart from feedback of items like hardware maintenance software reliability and so on, you may very well be able to make joint purchases of consumables (continuous stationery discettes printer ribbons) and save a few pounds If you have very similar configurations some form of mutual break down standby is also useful insurance



One way of finding out

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Some more rules of thumb

A double density five inch mini floppy *disc* will hold 600 – 750 customer account records a double density eight inch floppy about 2000 (Do not entertain the idea of holding a file on more than one discette) A configuration with two of the latter costs £300 – £400 more than one with two of the former A configuration with two double density double-sided 8in floppies will be about £1000 on top of that

A *printer* is going to cost anything from about £500, for 120 cps eight inch-wide printing of adequate business quality, to about £1500 for letter-quality printing with full-width capability

Expect to pay about £3500 for a basic small *configuration* with two double density five inch floppies a decent VDU, and a 50 cps printer

A *medium sized* set up with two double density eight-inch floppies, the same screen and a 120 cps printer will be close to £5000

Software costs will be *additional* to the above Well tested software with a good level of documentation, operator manuals helpful screen dialogue (another useful indication of the quality of a package) robust routines and some hours of supplier s time for operator training will cost about £350 per application Word processing might be £100 less and more specialised applications say £150 more Be very leery about any package that is significantly cheaper and remember that £350 is worth at the most five or six man days and a relative layman is not going to achieve much in the way of programming for that money if he is going to charge his time out against the computerisation project

So it looks as if the micro business man is liable to spend at least £5000 in the first year if he plans to implement four applications in that time (Don t forget maintenance which will cost about 10% of hardware value for the first twelve months of a contract and will follow inflation thereafter and don t forget insurance which is a virtually negligible cost)

If the kind of informed approach which I have suggested is made to potential suppliers the risks are acceptably small ■

■*Geoff Norman is the training course manager for Infotech*

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SMALL-SCALE BUSINESS COMPUTING

Large-scale problems?

This article by a leading writer in the computer field is part advice part cautionary tale

It has taken rather longer than forecast for the microcomputer revolution to reach the high street shops. Whether it now takes an equally long period of time to reach the business user remains to be seen.

At this stage, the DP professional parts company with the newly emerging market place. Computers, whether micro desktop or mini are not purchasing ventures to be handled lightly. Selection and implementation procedures require much deliberate and dedicated consideration involving full-scale evaluations compatibility and feasibility studies. In no way should one contemplate computing as being an impulse buy or an instant take away product available at the local supermarket. The DP industry at least at this point in data time, can only look on in consternation from the sidelines.

It could be however the DP profession itself which will have to re-evaluate its total approach to the acquisition and subsequent use of small-scale machines.

Background

The DP industry is possibly the most dynamic ever recorded. This dynamism has been until perhaps recently almost totally directed towards the large-scale user. The first computer machine in fact was designed and built to assist Universities. Computers were seen as gigantic (in terms of both size and capability) number crunchers. Had such resources been available to the Einsteins or Leonardo da Vincis of the world, cultural and scientific evolution would probably have been advanced by several generations.

In computing terms a generation is no more than a decade away – give or take a year or so. The past five to ten years have witnessed a drastic change in the computing industry. With the substitution of the thermionic valve and transistor by silicon chip and integrated circuit technology computer power and performance has dramatically increased while the size and bulk of the machine has diminished.

Despite these technology changes the basic concept of computing at least until the past year or so has been resolutely that of a tool for large users. Scaled-down versions of the manufacturer's range were marketed for the medium sized customer but to all intents and purposes the computer system required the *same degree* of skills and expertise as did the larger versions. Should the user decline to get involved in computing at that level there was little alternative but to incorporate an upgraded accounting system.

Gradually the accounting machine evolved into what is now termed a desk top or business computer. All too often however such systems offer little more than a computing compromise – being relatively slow inflexible and often far from cheap.

The Micro Impact

With the arrival of the "Mighty Micro" as it has been termed it is now feasible to purchase for about £6,000 computer power which would have cost almost £1m in 1966. Estimated world sales of microcomputers this year are nudging $1,000m. Even the most dedicated DP professional must now be wondering whether a rapid course in micro code languages would not be advantageous.

Without doubt such a course of action is advisable. While there is no apparent shortage of machines related software and application programs are noticeably thin on the ground – or suppliers shelves. This therefore could well be the major drawback area of the microcomputer. It is apparently easy enough to assemble varied components together to produce a small computing machine especially as there are now an increasing number of related companies providing ancillary components such as input output devices, terminal screens printers and storage products. In fact several of the large specialist computer companies are now developing and marketing both on PCM (Plug Compatible Manufacturer) and OEM (Original Equipment Manufacturer) lines micro technology products.

Unfortunately the software application side of this micro enterprise has so far failed to keep pace with the technological hardware developments. Whether this factor will be a stumbling block or a challenge for the prospective users will no doubt emerge during the 1980s.

Setting the rules

The computer industry, being what it is never knowingly resists a challenge. Having got the product to the market place it must now set about selling that product. It is at this stage that certain areas of the industry have reservations. The marketing of large medium or even mini sized computers has well established ground (or installation) rules. The selection and purchasing assignment is not one to be lightly undertaken. Professional buyers, or advisors meet the professional seller and, following much deliberate ritual by both parties the respective vendors propose what seem to them to be the most suitable model from their range. The buyer meanwhile *evaluates* several such proposals and following equally well chartered routines makes his final selection.

The venture is seen very much as a partnership between the supplier and user with both parties remaining in close after-sales contact. These close encounters of a purchasing kind do not exist in the world of microcomputer sales markets. The relationship between buyer and supplier is more distant with the buyer being very much out on his own, once the order has been signed. In certain cases, both the system and the new owner require a certain amount of basic training and possibly nursing. But such care and attention is noticeably absent in many micro sales cases This would seem to be a subject which will have to receive the care and attention of the micro industry especially in respect to the business user

This view by no means denies that other categories of micro user deserve similar consideration But in certain cases this care and attention is not so critical Certainly the home hobbyist is only too happy to solve such problems and probably regards them more as a challenge than a set-back Hobbyists like (possibly) schools and similar academic users have time on their side not a managing director or chief accountant breathing down their necks Likewise the government and State organisations need not necessarily be the concern of the micro industry as there certainly seems to be no shortage in this area of computer advisory boards and councils

It is the business user therefore who needs most protection and advice To date this area has been noticeably short of such help Micro publicity tends to concentrate in the main on the benefits and wonders of the machine Life it is suggested will be made easier and all who join the micro club will be enriched. While the majority of micro sales organisations are still entreating the rest of us to take the micro for granted there are hopeful signs emerging that not all prospective purchasers now see the micro as being stunning and beautiful

Even *Computer Age*, acknowledged as being perhaps the most authoritative and enthusiastic guide to all things small in computing has thought fit to lob in a few hesitant suggestions for improving the micro market place In a special marketing overview article in April *Computer Age* identified the principal sectors of the small computer market and compiled a dossier of current problem areas

These areas included the lack of standardisation of both hardware and software and a general fragmentation of selling principals among the vendors The article called for the formation of a "small computer market association" to represent the industry Its aim would include those of maintaining standards promoting the education of users and generally representing the micro industry

Such a representative organisation is urgently required if disillusion among business users is not to be allowed to set in Already there are signs of mounting protest with both vendor and user indulging in micro slanging matches The micro user cause has been picked-up by the Institute of Data Processing Management masterminded by its general secretary Ted Cluff

Already several positive steps have been triggered by the Group The IDPM represented the business user in a recent phone-in programme on a local London radio station This exercise has drawn much subsequent industry comment Even more relevant possibly is the formation of a new independent IDPM group – "MICUS" (Micro Users Group for Business and the Professions) Meetings are regularly held in the main centres of the UK and it is not unusual to attract one hundred or so members and guests to the specialist surgery sessions

All this activity goes to prove the disquiet being felt by the traditional computing industry for what appears to be taking place on their periphery Even allowing for the natural concern of DP professionals that their protected position could be at stake the IDPM must be on the right lines with their realistic approach.

Buy now – repent later

That rules are needed will be questioned by many vendors of business machines and computers The trend towards off-the-shelf purchasing far from declining appears to be accelerating The instant take-away era is already with us with impulse buying being only a power-switch away

Buy now and repent later could well be the current sales slogan The regrets of the user could well be lengthy – in contrast to the sales literature which is, all too often skimpy The equipment may be ready for use but in many cases, that use is not what the purchaser had in mind and no amount of subsequent argument will alter the fact

'Take out soundings from existing users'

What appears to be regrettable to the traditional DP man is that prospective users are encouraged to get into computing through the shopkeeper's door Is this response justified and if so what should be done about it?

For many a user it must be admitted an off-the-shelf micro will serve his limited needs very well Providing the requirements are for a very basic application such as bought and sales ledger invoicing or payroll and the user sticks to the proven reputable vendors, then without doubt all should be well Problems however set in when defining reputable and requirements A particular shop may well have a good reputation for selling hi fi or pocket calculators Extending the salesmanship into computing does not necessarily result in technological confidence Similarly a store specialising in selling office equipment would not be expected to provide a computer technology sales and service

Defining reputable equipment is equally fraught with problems With new machines and vendors emerging at a fast rate of bytes, it is particularly hard even for the knowledgeable DP professional to keep pace Even so there are similar levels of advice applicable to computers as to most other products There is for a start a need for the prospective buyer to *take out soundings from existing users* Next advice is to closely study the various application articles which appear in the trade and business press such as *Computer Age* Not only will these reveal the attributes of respective systems but will give relevant pointers as to possible uses and applications Visiting trade exhibitions and fairs give equally good indications and ideas

The general euphoria of the exhibition environment should not however encourage the prospective buyer to make a hasty decision The opportunity should be taken to ask a series of pertinent questions including:

- **The level of manuals and documentation which come with the system**
- **The number of application software packages available**
- **The number of these packages in current use**
- **Reference points of existing users.**
- **Level of after sales service**
- **Availability to enhance the system**
- **Availability of peripherals**
- **Credibility of the supplier and/or manufacturer**
- **Level of system support both at implementation and later stages**
- **Cost of such support**
- **Competence and general enthusiasm of the sales organisation**

Providing the user obtains a satisfactory response on these points all should be well Of course taking this safe but sure route would tend to eliminate those suppliers who happen to be relative newcomers to the marketplace Such vendors however are often best left to the enthusiastic and experienced users It is not for the business user to take risks particularly where his company's cash reputation and operations could be involved The business user will in any case have quite enough problems on his data-plate without taking the pioneer line

At the selection stage of the proceedings it is essential that the user has a very clear idea of what is wanted A vague approach on the lines that there are several bottlenecks in the present invoicing system or that a stand-alone inventory control system would be very plesant are far from being adequate grounds for making a buying decision

The groundwork should have been prepared *long before* the selection stage has been reached Why is the invoicing system proving such a problem area? Are present workloads abnormal? Would implementing existing procedures on to a small processor be OK in short term but rather more problematical at some later stage? Who will run and control the new system? The accounts manager company secretary or accountant?

Having done his homework the small business user should not then settle on a visit to the local electronic stores cash or cheque book in hand Computing is noted for being a logical and practical science Providing the potential business user approaches the exercise in the same way, all should be well

Otherwise the next off the shelf package could well include a bottle of aspirins tranquillisers and a do-it-yourself electronic manual and guide ■

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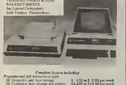

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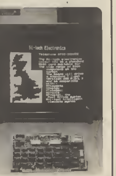


A tutorial and assessment [illegible] article is aimed not only at the sm[illegible] but also at professionals who when considering writing packages ought to have an insight into the real needs of their potential customers

SALES LEDGER

New Book-keepers start here

A Sales Ledger (or Accounts Receivable in the US) is one of the required proper books of account" of a business It must be kept up to date and the Auditor will expect to check it in detail at the end of the year In the case of investigation for VAT Inland Revenue, or (heaven forbid) insolvency the examiner will also expect to see it and check it

But that is not the chief reason why it is necessary, any business requires to look to its cash position, to minimise the overdraft or use available cash for profitable purposes So if you have to sell goods on credit it is essential to keep the period of credit to the absolute minimum, by giving the customer an invoice promptly, and sending him a statement to encourage him to pay when due

If you can duck the whole credit business it is probably worthwhile to do so If you can sell for cash on the nail or by credit card or factor" the sales credit to someone else for collection this may be the best way

Nevertheless most businesses have money owed to them for sales, and Sales Ledger is the most popular application package on small computers

Six documents are involved in the Sales Ledger application

- 1 **The Invoice** a piece of paper sent or handed to the customer showing the date the customer s name and address the description of the goods so he can see what he is paying for the quantity price amount payable less any discounts and plus VAT if payable Most invoices also state the credit terms which can be Net on delivery or less cash discount 2½% if paid within 7 days" or Net 30 days from date of invoice etc Net means the full amount is payable The invoice forms are normally pre printed with a serial number to prevent fraud Sometimes an extra copy of the invoice goes with the goods as a Delivery Note
- 2 **The Day Book** a list of the invoices sent For convenience this list should be in date order and within that in serial number order so that you can see there are no invoices missing The total of the Sales Day Book gives the value of the goods sold You may wish to analyse the Day Book to types of goods and services sold Credits (for errors or goods returned) will be listed either in this book or preferably separately
- 3 **The Cash Book** a list of cash received and posted to the sales ledger It may be the same record as the other cash transactions of the business but on computer held records It is more likely that this would be separate and only the totals of sales ledger cash are carried to the main cash book
- 4 **The Journal** a special form of day book for any adjustments that are not Invoices Credits or Cash the way to sort out mispostings or other errors Entries are in pairs for each credit there is a debit (an entry on the other side) to balance
- 5 **The Ledger** a record for each customer with a complete list of each of his invoices credits cash and journal entries At intervals usually monthly the entries which are no longer required are purged and deleted from the current record but kept in the archives so that you can check back
- 6 **The Statement:** a detailed copy of the Ledger for the current month sent to the customer to remind him to pay It has no legal force the invoices should be the trigger for him to pay but only a few well organised customers will pay without a statement.

The whole system should balance at all times A control account is kept with totals of each batch of entries and the total of all the balances owing on the Ledger should at all times equal the balance of the control account

Lastly if you can figure out what to do with an invoice, credit or cash item you can post it to a suspense account till you think of something It is not correct but at least the books balance

I would emphasise that the whole exercise is designed to get the customers to pay as soon as possible If he can be persuaded to pay on the Invoice so much the better There are three classic tactics for delay which troublesome or impoverished customers produce

- Please send me a copy invoice [illegible] photocopy one for him
- I never had it So you photocopy the delivery note
- I already paid. So you send him [illegible] of the statements showing the unpaid invoices and all the payments [illegible] date

If he gets too difficult you can make a note to insist on cash with order in future which is what I recommended before

New Computer Users Start Here

A micro computer for sales ledger will require, typically

- a printer
- file storage
- a processor

You will need some programs normally a standard package, and you will need manuals, training and advice from the vendor Both the computer and the software will require maintenance when they go wrong You should look for a computer and a set of programs that will grow with you as your business grows that is they can be enhanced

Visual Display	needs to be wide enough to take a complete transaction on one line Most accounting systems are designed for 80 characters 24 lines down the screen is normal
Printer	most packages are designed to print up to 10 columns of figures and this demands 132 character positions across the page Speed rather than elegance is the rule a matrix

printer giving upper case letters and numbers will be acceptable

Processor the type of microcomputer chip or the 8-Bit/16 Bit arguement need not concern you But you should get a lot of main memory 64 000 characters should be enough for a single user system Programs in BASIC in particular use large amounts of memory

The Cromemco [illegible] of 17 machines [illegible] MicroCobol

File Store the bigger the better [illegible] less than 500 000 characters on line with a lot more on additional floppy discs If you have too little storage to hold the programs and accounting data on line then you will be forever swapping discs which is less convenient If you go to hard discs make sure you have [illegible] so that you can keep a copy or have one of them exchangeable so you can copy the files and remove them from the system for security

Programs you can write your own Sales Ledger programs If you are a good programmer it will take you about two to three months full time To hire professionals to write a sales ledger would cost £4 000-£8 000 So most people buy a program package costing between £300-£1 000

Maintenance on the hardware it will cost 10-15% of the purchase cost per year and will typically give a 24 hour response to a service call But you must plan on the pessimistic basis that the computer could be down for a week Can you borrow a machine from the supplier or fellow user if you get stuck? On the software the vendor should help you to get round a problem and

Book Keeping

[illegible] than at the p[illegible] permanent [illegible] monthly enh[illegible]

Training and documentation a proper user's manual for the hardware and the software package should be av[illegible]

[illegible] the [illegible] It is your bill [illegible] Tel[illegible] should [illegible]

The Vendor requires [illegible] skills [illegible] out the [illegible] Consultancy [illegible] needs to the best [illegible] Installation help [illegible] started [illegible] the bugs [illegible] the hardware [illegible] to provide stable [illegible]

[illegible] support during the life of your system If all this is in one man he may be stretched a little thinly over his range of customers

MicroCobol Sales Ledger program package

History

The program package is written by CAP-CPP, the largest independent software house in the UK with about 1 000 staff At any one time about 70 programmers are working on micros In particular upwards of a dozen people in the CAP-CPP MicroProducts subsidiary are concerned with application product support and enhancement

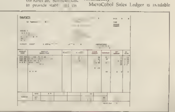
MicroCobol is a COBOL based language developed by CAP specially for writing business programs for micros It has significant differences from ANS COBOL but provides a number of desirable features which normal ANS COBOL cannot satisfy, for example it has good sub-routines modules and overlays it has very good visual display screen handling including a display mapping option and most important is has machine independence so that any program developed in MicroCobol on any of the supported minis or micros runs without any change or recompilation on any of the other supported machines This is done by compiling just the once into an 'intermediate commercial code' which is machine independent and runs with an interpreter specific to each individual machine configuration

MicroCobol Sales Ledger is one of six MicroCobol application packages The others are Purchase Ledger Nominal Ledger Payroll AutoIndex (for fast file access to a database) and AutoClerk (for file maintenance and report writing) The MicroCobol Development System is also available on the full range of supported machines

Programs written in BASIC can still be run on the same machine you need to construct a special program to convert files written in other such languages to the acceptable MicroCobol file structures

Availability

MicroCobol Sales Ledger is available



INVOICE

from 23 agents in the UK These agents sell micros of different types The software is only available from the same sources as the machines, and that agent is totally responsible for both hardware and software only referring back to CAP if he cannot find a solution

The 17 supported machines are ADDS System 70/75 Cromemco 3 DSC-2 Durango IBM Series/1 Horizon (soon) IMS-8000, Mostek SYS-80F Panasonic PDP 11/LSI-11 SDS 100 Sord M223, Transdata CX400 Triton 3 TkI, Siemens 6-610 Spectrum III

At least three of these systems are offered with additional software for hard discs and multiple terminals if required The list of agents and machines changes almost from day to day and a full up-to date list can be obtained from CAP

The Sales Ledger

The package is fairly large and sophisticated It has some 35 individual programs scheduled into memory from a library on disc controlled by menus on the display and selected by the user The programs come on two floppy discs one for the daily

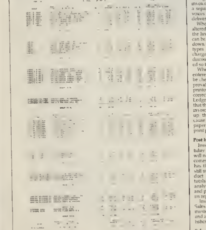
Book Keeping

runs and the second for the month-end and year-end programs If you require to take the invoicing and stock control options these come on two or more floppies Data files are additional, at least two floppies more if you have large files The kit comes with a set of sample files with some data already loaded so that you can practise until you are familiar with all the features A blow-by blow checklist of every display screen and key-entry response is listed in the user manual

You should be aware of what you are getting into You will have a six foot table with key board display, dual floppy discs or pair of hard discs and a processor which may be within one of the other boxes The printer will be on a separate stand nearby to cut the vibration There will be at least two dozen floppy discs including the back ups There are boxes of pre-printed stationery and 14" wide listing paper And about 14 box files to store the paper reports the computer will produce The user manual will have to be supplemented by some additional notes to remind the user of the many little company specific points to remember from day to day

You don t so much have a computer problem Or even a software problem You have a new office system to set up and it is no more or less difficult to get right than any other new office procedure

There are less sophisticated sales ledgers This one has met most of the requirements This article will help you to select the one to suit you



Pre-Invoicing

If you take the Invoicing option you can use the computer to print invoices either before the goods are delivered or after If you print the invoices before delivery the Product file which is also the prime tool of the Stock Control Option can be used to warn you if there is insufficient stock in hand to fill the order A second copy of the invoices can go with the goods as a delivery note and yet another copy can be signed by the customer as proof of delivery

If you deliver the wrong goods or the wrong quantity then you cannot alter the invoice at that stage you have to make out a separate Credit Note In preparing invoices you can select from any number of delivery addresses held on the master file

When keying in orders the data can be altered at will until it is correct When all the lines are entered then comment lines can be added at the end These are drawn down from the Product file and are of four types free form comment fixed surcharges and percentage surcharges and discounts on the total invoice value entered so far

When the batch of invoices has been entered a hash total of the quantities will be checked with a prelisted total if one is provided, and the complete batch can be printed out for checking Once passed as correct the totals are posted to the Sales Ledger, and the credit limit checked to see that the invoice can be accepted When the invoice paper has been loaded and lined up the batch of invoices are printed Because of the hassle in loading the special paper it is not normally worthwhile to print just the odd invoice at a time

Post Invoicing

Invoicing after delivery sometimes gives tidier invoices The stock balance check will not be much use and the credit check comes a bit late when the customer already has the goods The invoice program will still update the sales statistics on the product records and will accumulate the totals for nominal ledger analysis VAT analysis and the totals for the discount and profit percentages on the sales analysis reports

Invoicing is not available without the Sales Ledger package the sales ledger master files are needed to provide names and addresses and to accumulate sales statistics by customer

Sales Statistics

Six different sets of statistics can be run at any time after running the statistics at the month end close a separate program is available to reset the accumulators and update the year to-date figures The reports are similar in format and show period and year to-date totals for units and turnover value with a calculation of discount allowed and profit percentages achieved Reports are by product product group salesman area type of outlet and if you wish by customer

Invoice Posting

If you do not take up the invoice option batches of invoices prepared by other means are keyed in following line-by line prompts on the visual display Only the totals are posted no product statistics will be prepared instead there is a neat way of entering any necessary multiple VAT rates and amounts and multiple nominal ledger analysis At the end of the batch the control total of amounts posted is compared with a prelisted total and the batch will be printed for reference Similar procedures are available for Credits Cash and discounts and for Journal entries each of which must be separate batches

Statement
Remittance Advice

Referencing

There is plenty of space for reference information each business has its own conventions The object is to be able to get back from the ledger statement or the summary monthly posting register to the original batch and document serial number This can be called Audit Trail but is more useful from day to-day to the user than merely once a year for the accountants

Security

The system user manual recommends very tight control over back-up copies of all the files After keying in each batch the manual recommends taking a security copy before doing anything else in case anything should go wrong during the posting operation and foul up a couple of hours work For master files it is recommended to have three floppy discs for back up used in rotation call them Grandfather Father Son A new back-up copy replaces Son which is then promoted to Father which replaces Grandfather

Book Keeping

which is recycled for use for the next operation

There is a Data Catalogue program to do the book-keeping to keep track of back-up files This is probably only essential if hard-discs are used and there are a number of versions and generations of the same file on a single disc

Similarly there is a Catalogued Procedures program to sequence programs through a series of operations Again this is only essential if some of the work is handled in the background in a multi programmed computer

Open Item versus Balance Forward

You can choose a mode of posting for each individual customer on the ledger If you choose Balance Forward then separate balances will be maintained for the current and two previous months and single total for the prior months Cash can be allocated against specific months or left to reduce the earliest month.

If open item the transactions stay on the file until cash or credits are specifically allocated against them On the listings produced each transaction is shown also in a Balance Owing column When cash is fully allocated to a transaction then this balance goes to zero and the transaction can be purged at the month end If only part of the invoice is paid then the full amount is shown on the file for reference but the part still unpaid is highlighted as the amount owing

Allocation can be done as the cash or credit is posted or at a later stage as desired All items will normally be printed on the month end statement but journal entries can be caused to suppress printing to create a tidier statement without misleading adjustments for clerical errors

Statements

The statement includes a Remittance Advice section printed alongside And the bottom line contains an aged analysis of the total You can print any statement or group of statements at any time and as often as required You can carry on posting invoices for the next month even though you have not closed the previous month the statement will exclude them

Other Reports

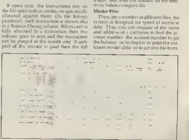
There are five different ledger listing programs,

- Aged Analysis a full list for the credit controller with the credit limit You can choose your own period end dates up to six periods
- Outstandings List a detailed list in full or for selected customers providing detail to support the aged analysis
- Trial Balance a full list of balances
- Sales Ledger Print to support the trial balance at required
- Current Period Postings Register – showing only the current period transactions in a form that can be used as a permanent hard copy record for the archives

If these reports are allowed to run for the whole file they will show totals at the end which can be manually checked with the control account balance which the system has been updating as each transaction is posted If something does not balance then there is yet another program that goes right through the file and adds up the transactions for each customer and compares them with the balance held on the ledger and with the balance on the summary balance enquiry file

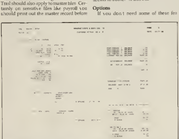
Master Files

There are a number of different files the system is designed for speed of access to data Thus you can enquire of the name and address of a customer to find the account number the account number to get the balance or to display or print the customer master data or to get into the trans



actions and print out the ledger All this is very fast by micro standards even with big files and slow floppy discs CAP have spent a lot of money getting performance out of micros with unusual architectures But some programs do run a bit slowly the statement printing run seems to go on a bit, and a faster printer doesn't seem to help either

The books on auditing state that Audit Trail should also apply to master files Certainly on sensitive files like payroll you should print out the master record before and after making the amendment highlighting the change made and referencing back to the authority for making the change You can do this on Sales Ledger Somehow it is a bit tedious and no one seems to bother Is this bad?



Options

If you don't need some of these features either switch them off when setting up the parameters of the system or just leave them blank The system is quite kind it will soon tell you if you are doing something you might regret

Integration

A list of nominal account totals and VAT totals is printed at the end of the month for posting to the nominal ledger There are plans for another program to post them automatically It will still be desirable to print these out for a permanent record before they are posted

Transfer between purchase and sales ledgers is by journal entry and requires key entry in both places

Robustness

I wrote round to all the MicroCobol agents about 75% replied which is about the normal response to any survey Of these about half are eager to sell Sales Ledger the others have it available if required It seems that there are about a dozen Sales Ledgers installed other than in the agent showrooms for demonstration I have visited two sites and it seems that normally it runs very well There are horror stories of course not least when the user is determined to use the system in a way the designers considered to be unwise But having got over the immediate problem the users seem to recover their satisfaction very quickly ■

The author is an executive with Spicer and Pegler Management Consultants

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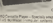

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SYSTEMS FOR BUSINESS

Espagna & Reality Royale

Based in the Northumberland market town of Hexham Espagna International was formed in 1968 by Doming Grande and his wife Elizabeth Their familiarity with the artisans and craftsmen of Spain enabled them to select and import a wide range of gifts and housewares which achieved immediate popularity The company began in an unused wing of the vicarage home of Mrs Grande s father Packing was carried out in the kitchen the garage was the warehouse The company now employs 170 people locally and imports artefacts from all over the world for distribution to retailers ranging from small gift shops to household name multiple stores and mail-order companies The company's other interests include a wholly-owned manufacturing company in nearby Allendale and a party plan operation called Fiesta Parties

George Perfect the DP manager says that some computer people have next to no experience of business and do not seem to understand the businessman's needs their relationship always an uneasy one based on mistrust leading to difficulty in figuring each other out He says You have got to find somebody who knows what he is talking about, and really look around, because the software is going to control what you can and cannot do"

Taking their first look at the small computer market they were hopelessly lost so they called in a firm of auditors but three months and £3000 later all they had was a glossy report countless brochures and a final recommendation which said 'We looked at A B and C computer companies, now take your pick!

In early 78 along came an office equipment supplier who said he could solve all their problems for £3000 He produced an outline proposal with a software house in tow, who said they would assess the company s needs outside the realm of standard packages The hardware delivered did not have enough memory space and the whole thing was called off The software house then asked if they could run all the custom written programs on another make of machine The next step was to order the machine and then the company received a call from the manufacturer saying Sorry we cannot supply you because the specification only calls for our processor using someone else s disc drive terminals printers We could not support that kind of installation

Whereupon Espagna said with relief 'Ah! A manufacturer at last This manufacturer then steered in another software house that promised a treasure trove of communication aids and support services in exchange for £23 000 Then as the problems and issues of hardware/software quality became murkier Espagna decided to advertise for a DP Manager and George Perfect entered the scene

Perfect s first concern was to make a success of the order entry system He gave the software house detailed exact requirements A month later the spec was delivered It was a bit of a joke says Perfect It had about [illegible] five major errors and numerous other small mistakes which should never have appeared in the first place

Espagna recovered rapidly from the disaster In February 79 George Perfect sketched rough report layouts listing software and hardware combinations Espagna wanted a database interactive system serving the company s present and future needs machine programmable in BASIC Management asked themselves such questions as What happens if you post an invoice to the wrong account? ' Is the credit checking system satisfactory? Finally they came up with a short list of hardware suppliers George Perfect decided to come out in favour of CMC and the Reality Royale

CMC promised 32K memory one-hour engineering call-out, technical support operator training, well-written manuals free educational courses and a wide range of programming – all strong selling points – within the price range of £64 000 The primary objective of the system is to provide accurate and consistent information to support the company s activities under conditions of rapid growth and change Perfect says After what we went through CMC Reality was a pleasant surprise Imagine our amazement when they offered to let us contact any of their exist ing users for a reference not just a select few like other companies

The system was ordered in the last week of April with delivery requested at the end of May the deadline was met In the same month Espagna s previous accounting machines developed faults requiring parts for which they were quoted four weeks delivery Faced with the total loss of their sales ledger they were forced to take a gamble They went straight in at the deep end, did not run parallel and did not test the system

The sales ledger was first phased in and all 2 000 customer names and addresses were put together with all outstanding items on the sales ledger Actually it was remarkably easy and our customers loved it says George Perfect The system went onstream in June 1978 and at first there were a few problems, but with a real team effort from CMC and Espagna everything has since gone according to plan

CMC sell two types of packages – MCS Manufacturing Control Systems for the manufacturing industry and BCP (Business Control Programs), for general order and accounting programs both were designed by Adserve SMI One of the vital decisions to be made by the businessman is whether he can adapt his business to suit an available package or must he accept the cost and risk of having a package tailored to his needs Espagna bought standard packages and compromised between their dream system and something off-the shelf

Adserve-SMI based in London provided the BCP packages Espagna bought the order entry sales ledger (with some 5 000 accounts) purchase ledger (about 250 suppliers) general ledger invoicing and sales analysis as standard packages Because of the limitations of the order entry system Espagna re wrote the system to gain significant improvements in the quality of the software and as they learnt how to solve one set of applications they were able to tackle harder ones

George Perfect himself has written a program which goes through the order file each night and allocates new stock where there is a shortfall or where there was no stock available at order entry The software now has no known defects The system provides for automatic stock-position and updating and a weekly production planning module allows calculation of the ideal stock holding on the basis of demand

The system will print new invoices showing customer discounts and calculate their settlement terms Perfect says a common flaw in any open item sales ledger is the fact that once an invoice is paid it is written off and no record is kept He has therefore written a program to list a summary of all cash transactions on account types of invoices age when paid etc and to produce the maximum minimum and average time taken to pay an invoice by customer the number of transactions and the number of times they have taken settlement discounts This means that we only have a one point entry – an order comes into the building it is entered into the machine and eventually at the end of the day everything is done for us says Perfect The system produces the delivery note on demand and when despatch is confirmed an invoice is printed It updates the stock customer history sales analysis credit files and so forth At the end of each month the system provides statements from the sales ledger, age debt reports etc

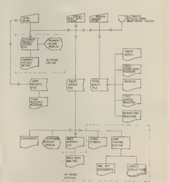
The purchase ledger program will probably be phased in sometime later this year The nominal ledger and payroll will go on to produce a fully integrated accounting system so that purchase sales ledger and payroll will link into the nominal and Espagna will receive their profit and loss reports automatically

RPL (Real-time Programming Language), purpose-designed for Reality Royale, by SMI in the United States fits into the file layout and the general architecture of the machine George Perfect describes RPL as a very cryptic language that fits Reality like a glove' easy to learn and similar in a few respects to BASIC but executing three or four times faster George Perfect says that anyone with six months experience of a programming language will master RPL with little difficulty

The interface between RPL and BASIC is not the best available but there is nothing to stop the programmer updating the same files with either language RPL is a much nicer language to work with on Reality Royale because it is a lot quicker to write to debug and to execute "

At their Hemel Hempstead Customer Education Centre CMC run a number of training programmes for non technical personnel and management (as well as EDP cognoscenti), everything in fact from computer appreciation courses for senior management to customers about to become first-time users to refresher' courses

Espagna has written programs which Mr Perfect would like to offer as a user oriented system to other companies in the form of a complete on line computer bureau



The company now has a library of programs compatible with the packages which they purchased and they see a healthy demand for these from other users of the same packages To date they have complete systems for credit control sales functions salesman commission and stock control as well as many reports and terminal enquiry programs all of which they feel add greatly to the value of the base packages

Espagna as a time sharing bureau would offer their customers a payroll and general accounting computer service Perfect claims he can offer other business users a lot of processing power greater than that available to a user with his own micro system the user would not have to [illegible] any programming language at all and Espagna would [illegible] and service

The System

The Reality system allows the user to log on to an account where each account is a logical group of files or in the case of a time sharing bureau each account is a user. Each user can then create access and maintain data files and records within protected files.

To key into the order entry program the user requests the option number and the menu displays a number of options. From here you can choose to enter orders print acknowledgements select orders to be printed as delivery notes or print a complete list of all orders on file Fordet says.

The system runs for the most part automatically. It was very difficult to convince people that it is possible to automate (as opposed to computerise) a large part of an order entry system. No human likes to think he or she is being reduced to the level of an automaton. We have been successful in achieving the right balance between automation and concern for our staff. A similar system installed in their credit control department has reduced their 90 day debt to one tenth the previous figure while freeing staff to spend more time to contact customers and *make decisions* based on current information.

On the order entry program itself a customer with several delivery addresses will be filed and then called up automatically. The program will display the statement or invoice address, the order number and order date delivery/ship date name of carrier, as well as order settlement terms salesman code number of salesmen involved percentage commission to be paid and VAT if applicable.

To overcome the problem of allocating stock to future orders Espagna has written a program to check if the requested delivery date is more than 30 days away and the system will [illegible] with the message [illegible] allocate stock [illegible] word the system will [illegible] by the site [illegible]

Espagna [illegible] tered around the [illegible] and distribution [illegible] which provides [illegible] of both standard stock and special [illegible] ers like GUS (Great Universal Stores) and Littlewoods who will give estimates in January for what they require next winter.

'All they had was a glossy report'

To meet this need, Espagna has set up an electronic warehouse of reserve stock for all mail orders entirely separate from standard stock. They have found the program useful because all goods delivered into the building are received into site 1 and while there they can be counted and quality checked so that when stock is transferred across to their live sites they will actually be processing orders.

The system will also display the item description and the unit of measure – a useful utility converts units of measure. If the user requests an order quantity greater than the available stock the machine will display a message showing the quantity on hand in the warehouse. The system permits credit checking by order processing showing the customer's credit limit any overdue invoices and the value of order is checked to make sure it reaches the minimum value acceptance. Carriage charge or any other miscellaneous charges can also be added.

The order is passed and a delivery note is printed. In the case of failure of credit checks or if the customer is over credit then the operator would be prompted with the message over credit or overdue. If a password is entered the credit check is overwritten and the order is put on the open order file. If no password is entered the order is side stepped from the order processing chain and placed in a file called held orders. Once a day the held order file is listed so that the Credit Control department can either contact the customer for payment or make a decision on the credit limit.

Once entered into the open order file orders are selected in batches of 50 at a time for the warehouse to handle.

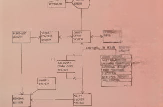
The standard package prints all delivery notes outstanding at any time for delivery of goods today, in six months or 12 months time which is then sorted and stored manually. On Espagna's system the operator can select either an individual order by specifying an order number or the computer will take the next sequential order, which allows the machine to keep track of those orders and commitments for future months. Any adjustments to the order are made before printing a delivery note eliminating the need to continually re-print. Once selected the credit check is carried out a second time to override another flaw in the standard package and the customer's credit problems are flagged on the order selection list. The system will check a minimum delivery value to ensure 'worthwhile' delivery ie it will not print a delivery note for an item costing only 25p. Any orders that appear on the selection list which the company decides not to send because of credit problems or if labelled not worthwhile are side stepped and the printer will then process a batch of packing tickets or delivery notes.

Espagna try to work a day ahead to safeguard against machine failure or pressure of work.

To fill another gap in the standard system, the system prints a stock requirement schedule picks up delivery notes which have been printed and produces a list of stock item by site showing exactly what is on those delivery notes for shipment out. The company can then send the report to the warehouse a day before the delivery note arrives and the warehouse knows well in advance the quantities required from stock which are then sent to the picking area ready for the next day's work.

Another program written in house is the printing of delivery labels. The system picks up delivery notes and shipment values, adds the total number of items to be shipped divides them by a constant and then produces the number of labels for that order. It then gets the correct delivery address and prints the required number of labels.

The system sends out acknowledgements to customers and a booking report gives details of all orders entered and any



adjustment, change or movement on a particular file in the system is reported in a transaction oriented report. The processing of open order reports enables the company to oversee all orders outstanding at any time and the back order handling system deals with goods not yet in stock. "I think if I was running the standard manual system I would be having a great many sleepless nights from my chair as DP Manager wondering whether orders had slipped through the credit checking," says George Perfect.

First-Time User

On support and after sales service Perfect says "There is no messing about here the Reality engineer comes along and fixes the system in his time rather than yours. Espagna has never been charged for engineering support from CMC. Recently they had a mains failure. We had the CMC engineer here from 1 o'clock in the afternoon until 9.30 in the night and it was free of charge. We also had offers from CMC's regional office to have a complete new machine installed in three days!" says Perfect. "They were actually prepared to take a demonstration machine from one of their sites, put it on a lorry and get it down here to the Espagna site and see it working, rather than see one of their users down."

"Support is absolutely paramount," says Perfect, "and the businessman should aim for a supplier who will say: 'Whether it is a hardware problem or a software problem we will take total responsibility for fixing it for you.'"

To date CMC has installed more than 180 machines in the UK and worldwide there are over 3,000 Reality installations; only in the UK do they refer to the machine as 'Reality Royale'. Machines are manufactured at Hemel Hempstead and the parent company, Microdata Inc., is in Irvine, California. CMC have agents and a distributor network in Europe, the Middle East, Gulf States, Far East and Africa.

Reality Royale has no typical customer and is used by a large organisation such as Courtaulds to provide local processing and perhaps report to a Group mainframe, and also by small £2 million turnover companies. ■

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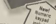

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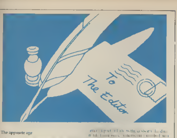

The apposite age

I am a 2nd year Computer Science student at the University. I find [illegible] and I would like to take this opportunity to say that I find your magazine extremely interesting, generally and quite pertinent to my course.

D Smith 22 Haddon Drive Pensby Wirral Merseyside L61 8TF

Oversight

While complimenting you on the quality of your magazine may I draw to your attention an oversight common to all [illegible] and other magazines.

There are two types of software companies [illegible] the field. The first is [illegible] equipment [illegible] and others use [illegible] standardised packages to justify the sale of the equipment. These are the software professional. This person designs and writes [illegible] to meet the requirements of [illegible]. There are obviously [illegible] general purpose [illegible] [illegible] general purpose package. [illegible] requirements [illegible] within that industry [illegible] [illegible] requirements.

May I [illegible] suggest that [illegible] should [illegible] [illegible]. A second [illegible] ask the [illegible]

[illegible]

interest part of the software industry [illegible] systems [illegible] by the [illegible].

It [illegible] that [illegible] would [illegible] acceptable. I would suggest the [illegible]

[illegible]

3 That the [illegible] should [illegible] [illegible] and design.

The [illegible] [illegible] the [illegible] the equipment [illegible]

4 [illegible] following [illegible]

5 That all systems written should be fully documented.

6 That the [illegible] should [illegible] [illegible] requirements [illegible] report [illegible]

[illegible] specification [illegible] program specification [illegible]

8 That [illegible] [illegible] systems [illegible]

Perhaps [illegible] items that [illegible] checked.

Keith Park Managing Director Parwest Ltd 58 Market Place Chippenham, Wiltshire

Serendipity

One of the very happy coincidences of being on study leave in England was that I was there when *Computer Age* first appeared. I find it a very fine journal which complements others and I admit to circulating the first two issues to my classes. This was not so much to breach your copyright as to show them the quality of thinking that is now coming into the computer journal area. The quality has, I think, improved with the February and April issues (for some reason I think the March issue must have missed a boat somewhere but will turn up in due course I hope).

Good journals are now coming from the United Kingdom as well as the United States. The *Computer Age* has indeed arrived.

D J Whalan Professor of Law The Australian National University Faculty of Law Box 4 Post Office Canberra Australia

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Computer Age — **April 1980 'Making Marks on Paper' by Joe Hemans**

I suggest that your [illegible] that Diablos [illegible] tested as [illegible]

Indeed the [illegible]

I think you will find [illegible] the only [illegible]

K Shaw, 105 Shaftesbury Way, Strawberry Hill, Twickenham, Middlesex TW2 5RW

The weak link

I have been dipping into a number of the current computer journals and on the basis of issue 4 your approach appears to come nearest to meeting my needs. I am currently engaged on manpower development planning with an ITB and I am interested in identifying, for my own personal development, routes into computer developments that will draw on my varied past experience in engineering, marketing and training. This clearly requires some initial training in one area of computer expertise and systems analysis appears appropriate for me.

I would suggest that there is scope for a series of articles exploring this issue. It is evident that we are entering an era when the pressures to change careers and occupations will increase and it is important that the routes to facilitate these changes should be clearly defined.

Probably many of these people will be older than those currently entering the computer occupations but they may well have a wide experience of the industries and functions which are beginning to use computers. As far as I can assess at the moment, there are training packages available for particular disciplines and skills, but the weak link is in obtaining the first job, since employers are seeking applicants with previous experience. A chicken and egg situation.

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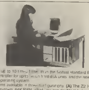

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